Panasonic

Operating Instructions

Impact Dot Matrix Printer

KX-P2124

Before operating this unit, please read these instructions completely.

FOR USE IN U.K.

CLASS 1 FOR BS7002

FOR YOUR SAFETY PLEASE READ THE FOLLOWING TEXT CAREFULLY

This appliance is supplied with a moulded three pin mains plug for your safety and convenience
A 5 amp fuse is fitted in this plug.
Should the fuse need to be replaced please ensure that the replacement fuse has a rating of 5 amps and that it is approved by ASTA or BSI to BS1362.

Check for the ASTA mark ◈ or the BSI mark ♡ on the body of the fuse.

If the plug contains a removable fuse cover you must ensure that it is refitted when the fuse is replaced.

If you lose the fuse cover the plug must not be used until a replacement cover is obtained

A replacement fuse cover can be purchased from your local Panasonic Dealer.

IF THE FITTED MOULDED PLUG IS UNSUITABLE FOR THE SOCKET OUTLET IN YOUR HOME THEN THE FUSE SHOULD BE REMOVED AND THE PLUG CUT OFF AND DISPOSED OF SAFELY.
THERE IS A DANGER OF SEVERE ELECTRICAL SHOCK IF THE CUT OFF PLUG IS INSERTED INTO A LIVE SOCKET.

If a new plug is to be fitted please observe the wiring code as shown below.

If in any doubt please consult a qualified electrician
WARNING:- THIS APPLIANCE MUST BE EARTHED.
IMPORTANT:- The wires in this mains lead are coloured in accordance with the following code -

Green - and - Yellow:	Earth
Blue:	Neutral
Brown:	Live

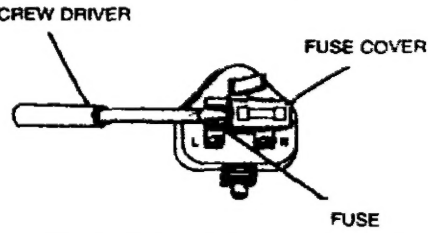
As the colours of the wire in the mains lead of this appliance may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows

The wire which is coloured GREEN-AND-YELLOW must be connected to the terminal in the plug which is marked with the letter E or by the Earth symbol ⏚ or coloued GREEN or GREEN-AND-YELLOW.

The wire which is coloured BLUE must be connected to the terminal in the plug which is marked with the letter N or coloured BLACK.

The wire which is coloured BROWN must be connected to the terminal in the plug which is marked with the letter L or coloured RED.

How to replace the fuse
Open the fuse compartment with a screwdriver and replace the fuse.



* This equipment is produced to BS800: 1988.

WARNING

- The power source voltage of this unit is listed on the nameplate. Plug the printer only into an outlet with the proper voltage.
- To prevent fire or shock hazard, do not expose this product to rain or any type of moisture.
- When you operate this equipment, the outlet should be near the equipment and should be easily accessible.

The serial number of the unit may be found on the label on the rear of the unit. For your convenience, note this number below, and retain this book, along with your proof of purchase, to serve as a permanent record of your purchase in the event of a theft, or for future reference.

MODEL NO. **KX-P2124** NAME OF DEALER _____

SERIAL NO. _____ DATE OF PURCHASE _____

Any details given in these Operating Instructions are subject to change without notice.

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3. Operation

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1. Introduction/Product Overview

Product Overview

This printer is a versatile, high quality 24-pin dot matrix printer which is designed to meet the needs of your office.

This printer supports the EZ Set Operator Panel featuring a 16-character Liquid Crystal Display (LCD) that lets you control a wide variety of printing conditions quickly and conveniently.

The EZ Set Operator Panel with a 16-character LCD allows you to control all printer functions including:

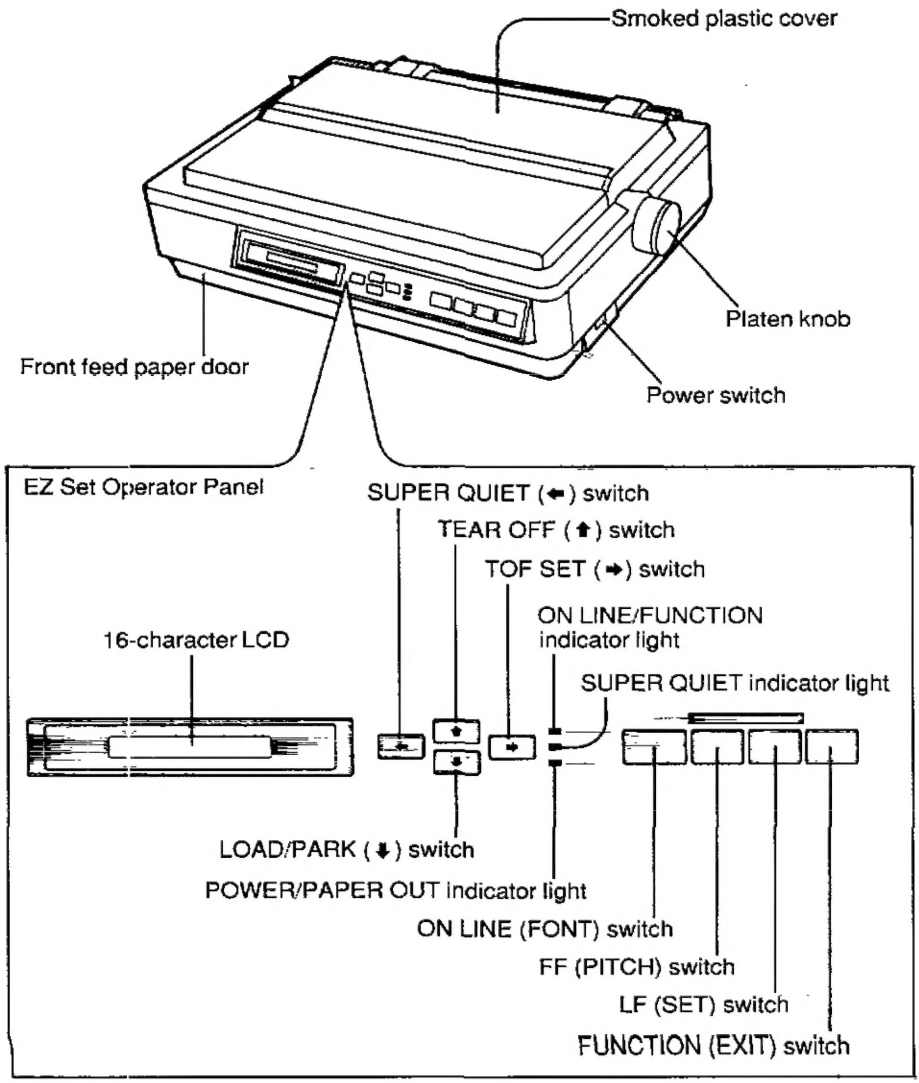
- ***Super Quiet Mode:*** Reduces printing noise
- ***Color Printing:*** 7 colors with the optional color kit (KX-PCK11)
- ***Fonts:*** 3 Draft (Pica, Elite, Micron)
  8 Letter Quality (Roman, Sans Serif, Courier, Prestige, Script, OCR-B, Bold PS, ORATOR)
  1 Super Letter Quality (Roman)
- ***Margin:*** Top, Bottom, Left, Right
- ***And more . . .***

Also this printer offers versatile paper handling including:

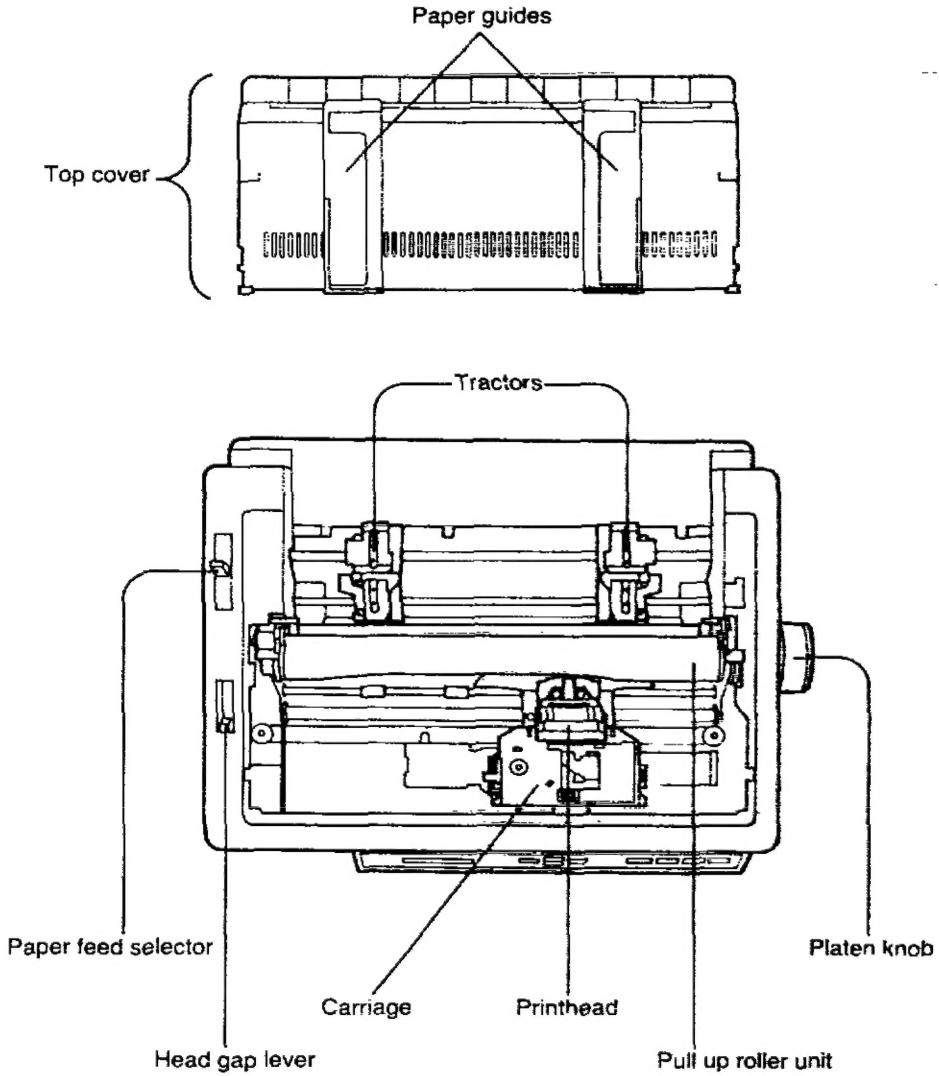
- ***Paper Feeding:*** Friction (), Tractor (Pull/Push built-in)
- ***Paper Paths:*** Rear, Bottom, Front, Top
- ***Paper Parking/Loading:*** Hassle free loading/reloading of fanfold paper
- ***And more. . .***

Parts of the Printer

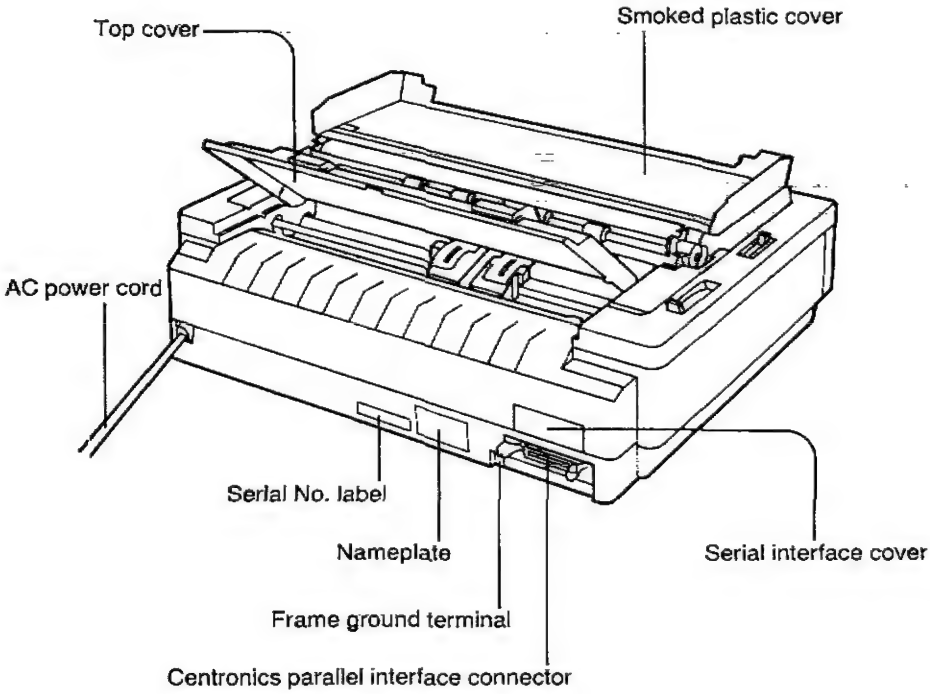
The Front and Right Side View



The Top View


Paper guides
Top cover
Tractors
Paper feed selector
Platen knob
Carriage
Printhead
Head gap lever
Pull up roller unit

The Rear View



2. Set Up/Site Requirements/Unpacking and Inspection

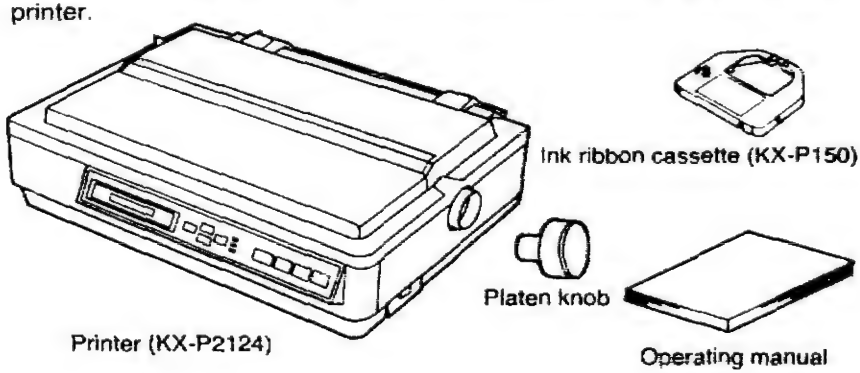
Site Requirements

This printer can be installed in any normal office environment. No special wiring or cooling is required.
However, do not use the printer under the following conditions:

- —extremely high or low temperature
  [temperature range: 10° to 35°C (50° to 95°F)]
- —extremely high or low humidity
  (humidity range: 30% to 80% RH)
- —areas of poor ventilation [a minimum of 4" (10 cm) clearance on all sides is necessary to insure proper ventilation]
- —areas of high dust concentration
- —areas with chemical fume concentration
- —areas with extreme vibration or when placed on an unstable or unlevel surface

Unpacking and Inspection

Having opened the shipping carton, carefully remove the contents. Inspect the printer and accessories for damage. Report damage or shortages to the store from which the unit was purchased. Inside the manual's front cover, record all important information regarding the printer.



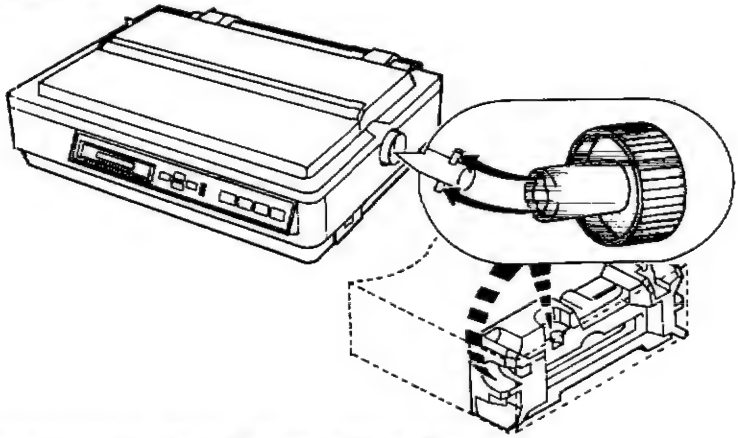
Note:

- **Please keep all the packing materials** so they may be used should you wish to transport the printer in the future. They are specifically designed to protect your printer during shipment.

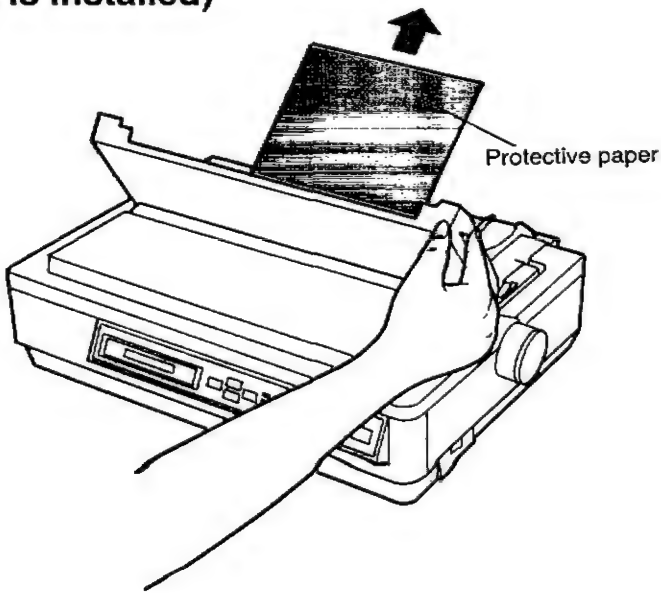
Initial Set Up

Installing the Platen Knob

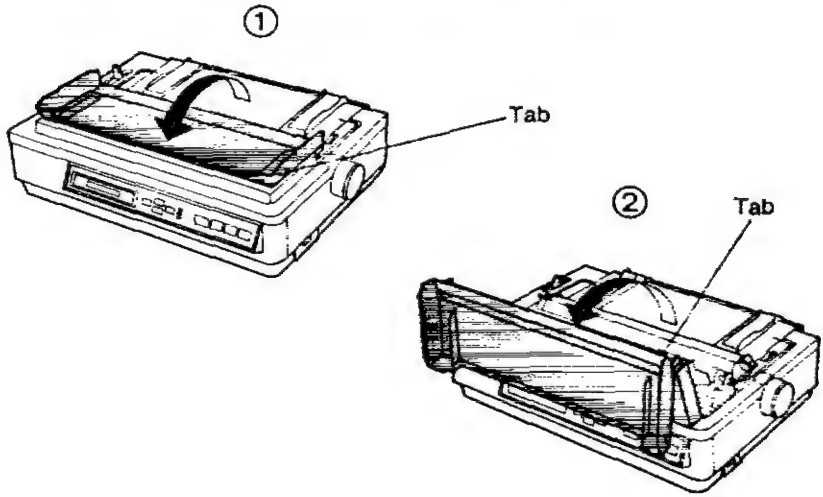
Insert the platen knob into the hole on the right side of the printer and rotate it slowly until it slips onto the shaft. Push the platen knob onto the platen shaft to secure.



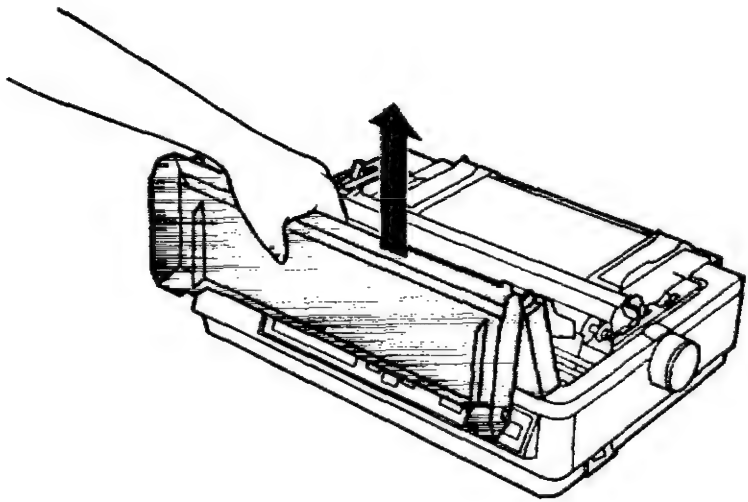
Removing the Protective Paper (If it is installed)



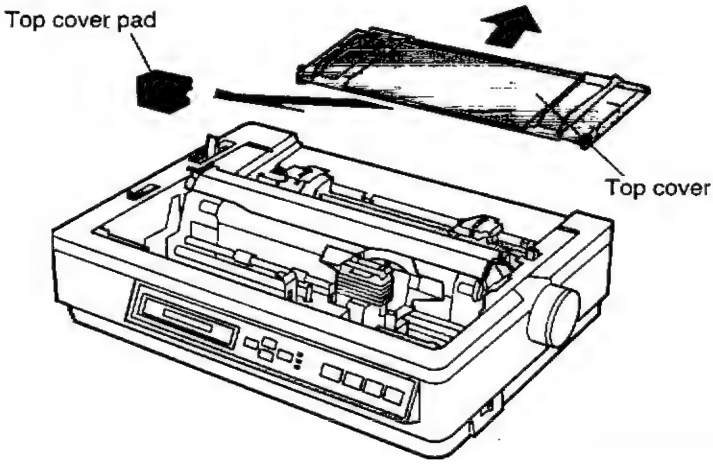
Opening the Smoked Plastic Cover



Removing the Smoked Plastic Cover

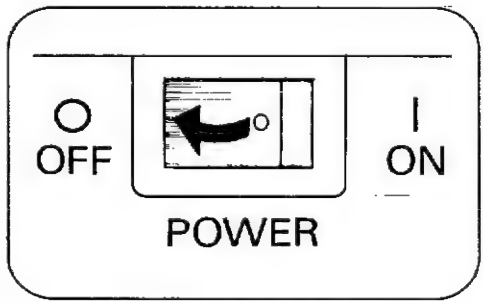


Removing the Top Cover Pad

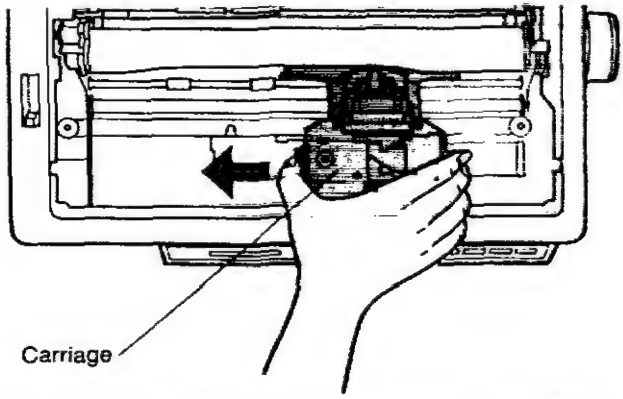


Mounting the Ribbon Cassette

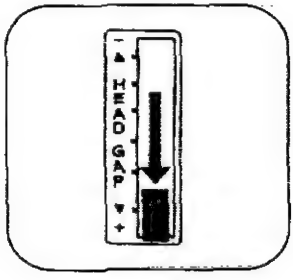
1. Turn the power switch off for safety.



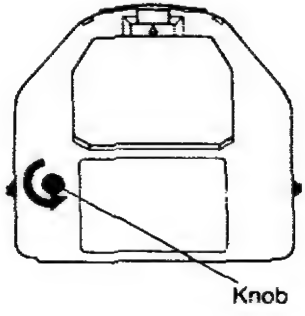
2. Slide the carriage gently toward the center of the unit.
(The smoked plastic cover should be removed. ☞ P. 2-3)



3. Set the head gap lever to the (+) position for smooth installation.

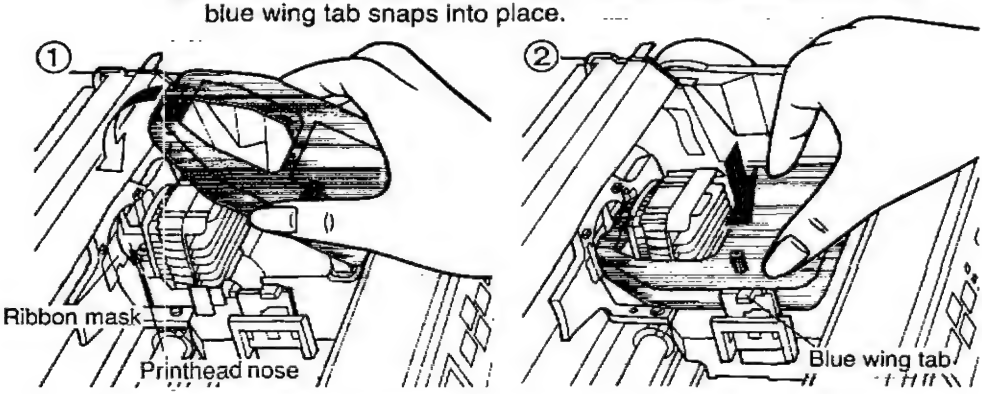


4. Rotate the knob on the cassette counterclockwise to remove any slack on the ribbon.



5. ① Position the cassette over the printhead and lower it in place. Visually check to see that the ribbon slips between the ribbon mask and the nose of the printhead.

② Gently, but firmly, press down on rear of the cassette until the blue wing tab snaps into place.

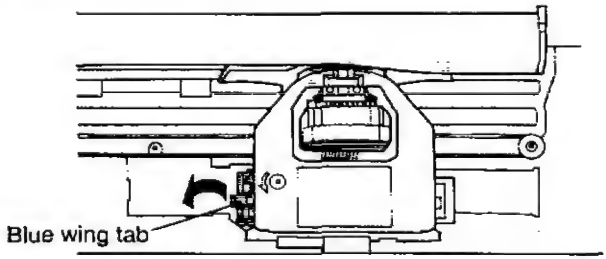


6. Replace the smoked plastic cover.

7. Reposition the head gap lever for the appropriate paper thickness. (☞ P. 2-11)

Removing the Ribbon Cassette

With the printer off, remove the smoked plastic cover. Spread the blue wing tab and lift up the cassette.



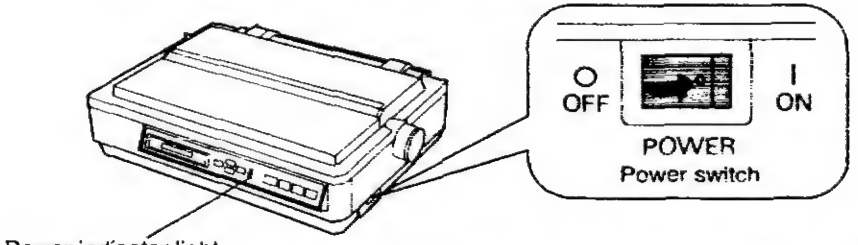
Caution:

- Because the printhead may be extremely hot, use caution when cover is removed.

2

Power Up

Plug the power cord into an outlet of the proper rating which is listed on the nameplate located in the rear of the printer.
When the power switch is on and the power is supplied to the printer, the power indicator light on the front panel will be lit.



Self Test

The printer has a self test feature which allows the user to test the printer.

1. Load a sheet of paper. (☞ P. 2-12—2-25)
2. Turn on the power switch **while** pressing the LF switch.
   All ASCII characters will be printed in draft, all 8 LQ fonts and SLQ will be printed in 10 cpi, then all characters will be printed in draft mode for approximately 20 minutes.

```
Version
Draft
  !"#$%&'( )*+,-./0123456789:;<=>?@ABCDEFGHIJKLM
 !"#$%&'( )*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN
"#$%&'( )*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
#$%&'( )*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOP
$%&'( )*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQ
Courier
  !"#$%&'( )*+,-./0123456789:;<=>?@ABCDEFGHIJKLM
```

3. To release the self test mode, turn the power switch off.

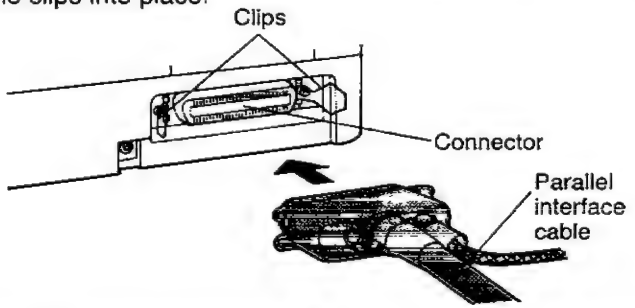
Is the self test printing satisfactorily?
If "Yes", connect the printer to your computer. (☞ P. 2-8)
If "No", see "Troubleshooting". (☞ P. 9-3)

Connecting Your Printer and Computer

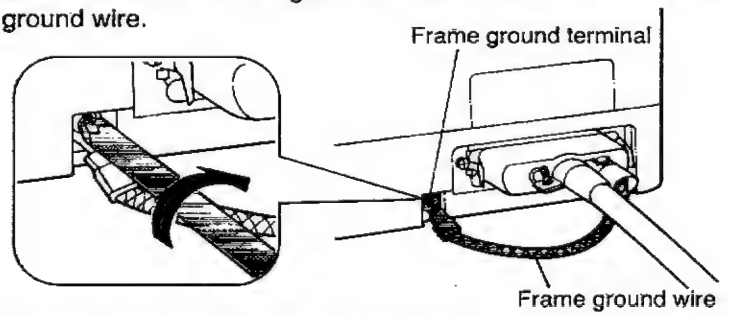
The computer communicates with the printer through an interface cable which you must purchase separately. The printer comes with a Centronics parallel interface.

1. Turn off the power of both the printer and the computer.

2. Plug one end of the cable into the connector of the printer and snap the clips into place.



Connect it to the frame ground terminal if the cable has a frame ground wire.



3. Plug the other end of the cable into the connector of the computer.

Note:

- If the connectors are not alike, make sure to plug the appropriate end into each device.
- ☞ Section 8 "Interfacing"
- An RS-232C serial interface (KX-PS14 or KX-PS13) is available as an option. With the KX-PS14 installed, it is possible to use the parallel interface.

Verifying Before Printing

Emulation

This printer's emulation is set to Epson when shipped. so be sure your software's printer selection is also set to Epson.
(☞ P. 2-28, 3-17)

Interface

When installing the KX-PS14 (RS-232C interface board) in this printer, the **I/F** Sub-menu in the **INTERFACE** menu defaults to **PARALLEL**. If you want to use the parallel interface with the KX-PS14 installed, change the setting to **SERIAL**. (☞ the KX-PS14 operating manual) This setting is only required with a KX-PS14 interface installed.

Cut Sheet Feeder Option

In order to activate the Cut Sheet Feeder option (KX-PT11), please set the **CSF MODE** Sub-menu in the **INSTALL** menu to **ON**. (Also remember to set the paper feed selector to "□" position.)
The **CSF MODE** should be set to **OFF** when not in use.
(☞ P. 3-37)

Note:

- The above-mentioned settings should be saved in a MACRO so that they are not lost when the power is turned off.
  (☞ P. 3-39, 3-40)

Paper Feed Selection

This printer has two paper feed mechanisms utilized by 3 paper paths. One mechanism is TRACTOR mode for continuously fed paper. In the tractor mode you can choose between PUSH or PULL.

The other paper feed mechanism is FRICTION mode. In the friction mode you can feed single sheets or envelopes through the front or top. The KX-PT11 Cut Sheet Feeder will accommodate automatic feeding of single sheets, from the top paper path.

MODE	PATH	BEST USED WHEN/FOR
Push	Rear	—doing any type of reverse paper feeding —enabling you to do Paper Parking —using single form continuously fed paper
Pull	Bottom/ Front	—multipart forms (See Note.) —labels
Friction	Top/Front	—single sheets —envelopes

Note:

- For optimum print quality, do not use reverse line feeding in pull mode. If reverse feeding is necessary in pull mode, set **REV L.F/PULL** in the **INSTALL** menu to **ON** through the Function mode. (☞ P. 3-36)
- Paper Parking is not available in pull mode.
- Multipart forms consisting of 2 parts may be used for rear feeding (Push mode). For 3 or 4 part forms, we recommend bottom feeding (pull mode) for optimum print quality.

Paper Feed Selector

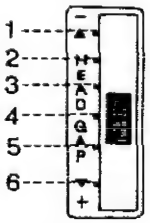
This selector should be set for the paper feed method you wish to use.

Position	Used for
(Friction)	Single sheets and Envelopes
PULL (Tractor)	Fanfold paper with PULL tractor mode
PUSH (Tractor)	Fanfold paper with PUSH tractor mode

Print Quality Control

Printhead Gap Lever

To compensate for the different thicknesses of paper that will be fed through the unit, there is a head gap lever that allows the operator to adjust the gap between the platen and printhead. This is accomplished by moving the lever forward (−) for thin sheets of paper and backward (+) for thick sheets. The lever moves in increments of 0.0028 inch (0.07 mm).



Position	Used for
1 or 2	Thinner sheets
3, 4, 5 and 6	Thick or multiple sheets Envelopes

Note:

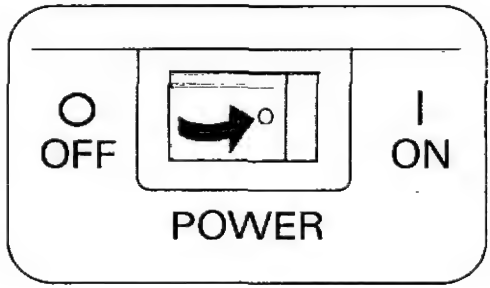
- If an ink smear occurs when loading paper or during printing, move the lever toward the lower position (+) until the smear no longer appears.

Paper Installation

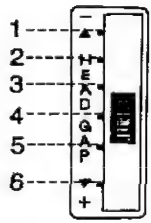
Fanfold Paper (Tractor PUSH, PULL)

Rear Feeding—with Push Tractor (PUSH)

1. Turn the power switch on. A beep will sound once and the PAPER OUT indicator will flash. This indicates that there is no paper installed in the printer.



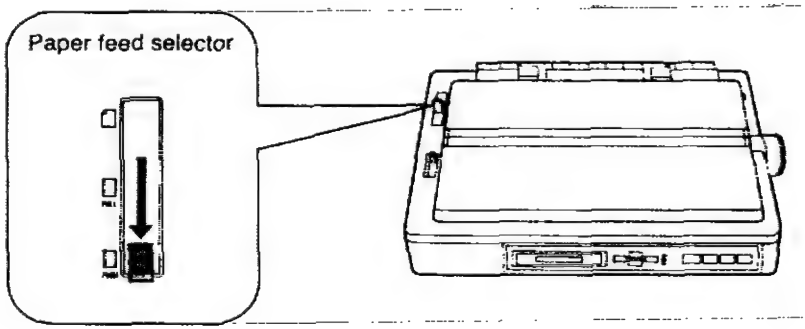
2. Set the head gap lever to the appropriate position for the thickness of the paper being used. (☞ P. 2-11)



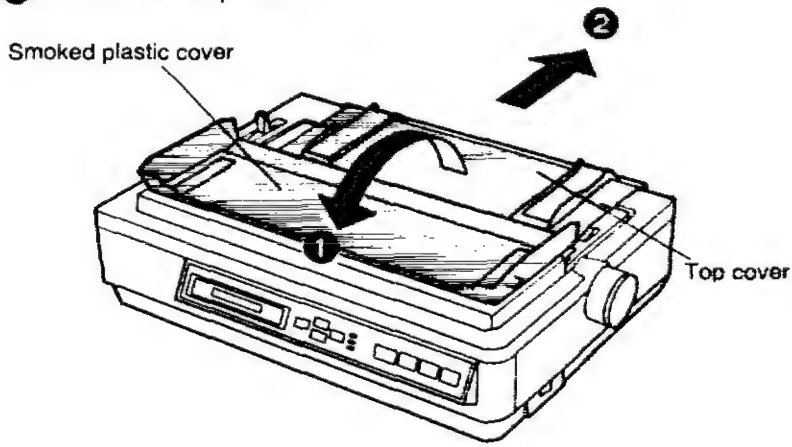
Head gap lever

Position	Used for
1 or 2	Thinner sheets
3, 4, 5 and 6	Thick or multiple sheets

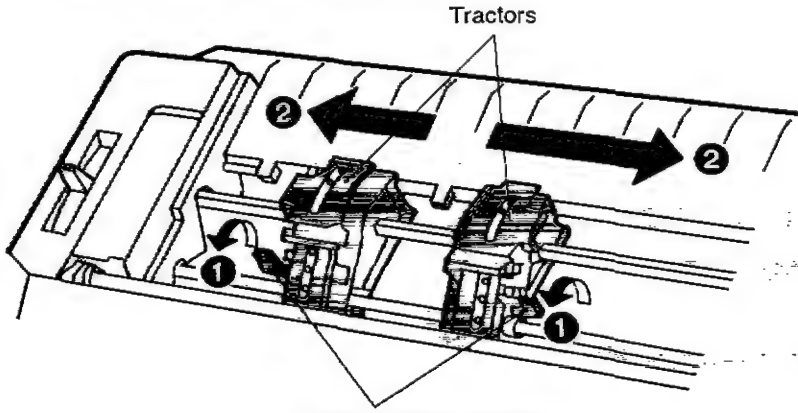
3. Set the paper feed selector to the "⬚ PUSH" position. The display briefly shows "TRACTOR/PUSH".



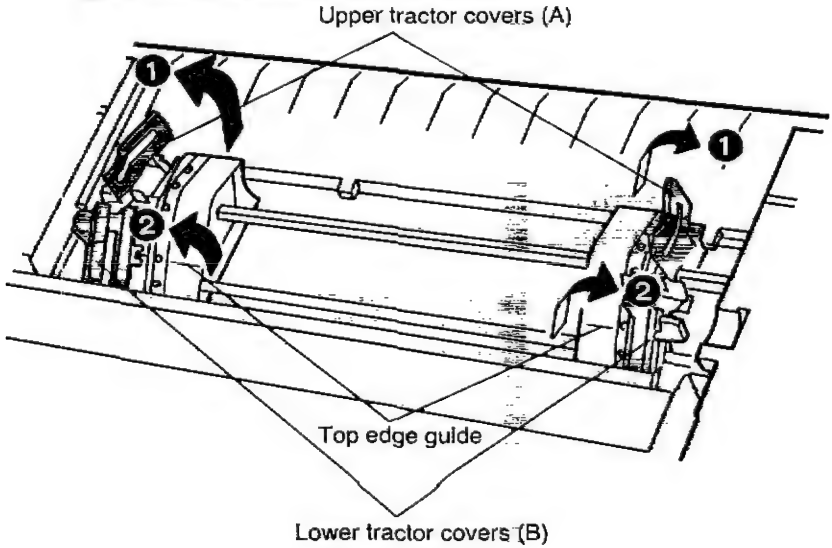
4. ❶ Fold the rear part of the smoked plastic cover over the front part.
   ❷ Remove the top cover.



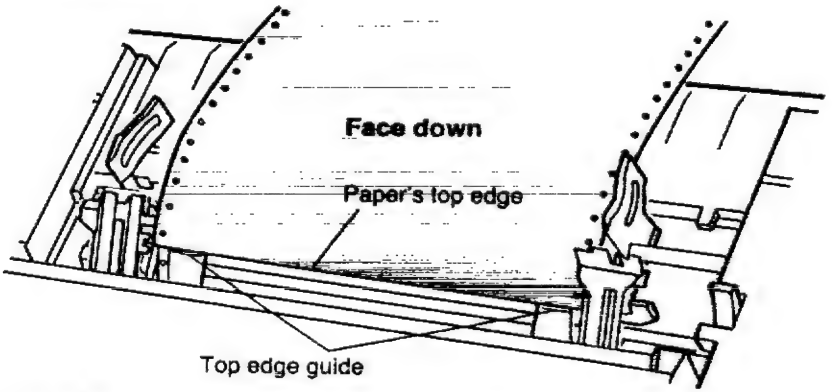
5. ❶ Unlock the tractors by pulling the tractor clamping levers forward.
❷ Slide the tractors out toward the sides to the approximate width for the required paper size.



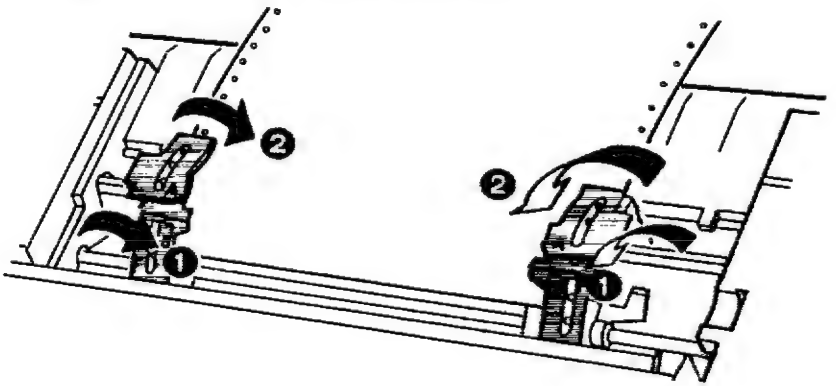
6. ❶ Raise the upper tractor covers (A).
❷ Raise the lower tractor covers (B).



7. Load the fanfold paper from the rear of the printer. The top edge of the paper should be in line with the top edge guide of the tractors to ensure easy loading.
Align the paper sprocket holes with the tractor pins. Verify the paper is straight.



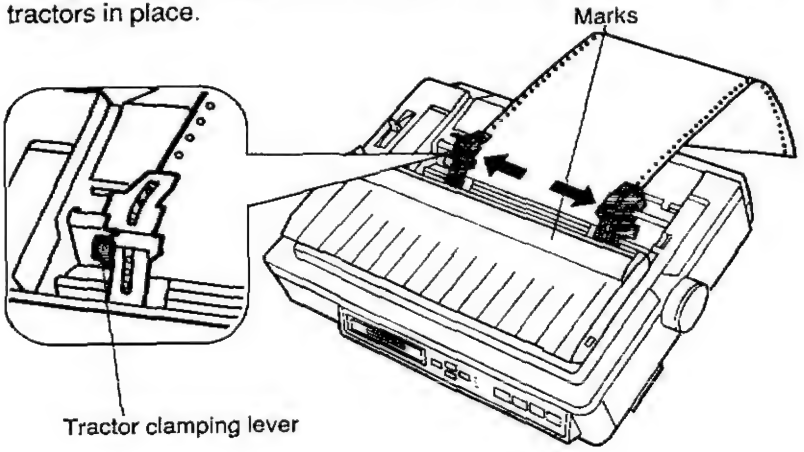
8. ❶ Close the lower tractor covers (B).
❷ Close the upper tractor covers (A).



Note:

- To ensure that the paper loads easily, and to avoid any possible jams, it is important to load an adequate number of paper sprocket holes with the tractor pins. (See top edge guide.)

9. Adjust the tractors accordingly to remove any slack. Align the paper horizontally by using the marks on the smoked plastic cover as a guide. Press back on the tractor clamping levers locking the tractors in place.



10. Press the [↓] (LOAD/PARK) switch to load the paper to the first print line. The display shows "PAPER LOAD" while the printer is loading the paper and then the PAPER OUT indicator will stop blinking.

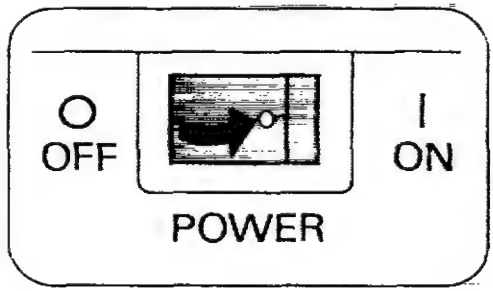
11. Replace the top cover, and then close the smoked plastic cover.

12. You can now adjust your Top of Form position (☞ P. 3-7) or press the [ON LINE] switch to get ready to print.

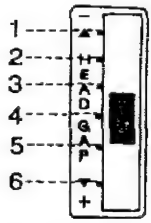
Note:
- To avoid paper curl in PUSH mode, park the paper after use.

Front and Bottom Feeding—with Pull Tractor (PULL)

1. Turn the power switch on. A beep will sound and the PAPER OUT indicator will flash. This indicates that there is no paper installed in the printer.



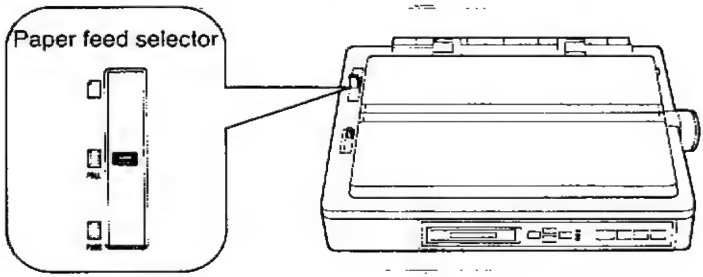
2. Set the head gap lever to the appropriate position for the thickness of the paper being used. (☞ P. 2-11)



Head gap lever

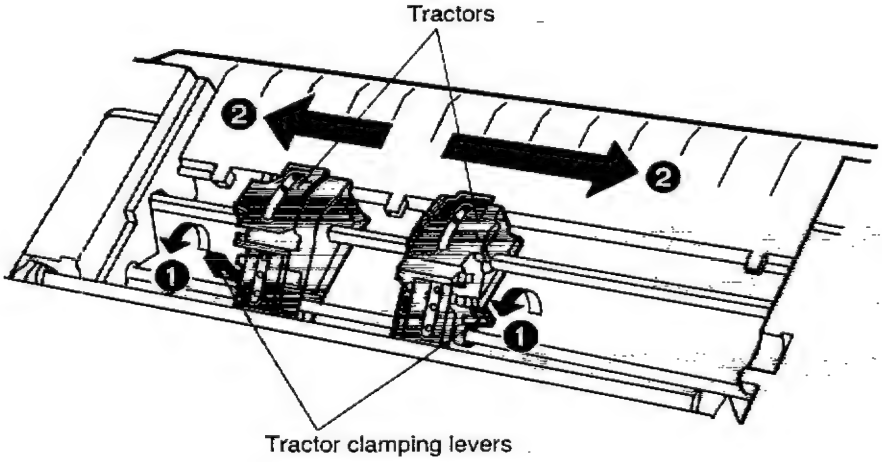
Position	Used for
1 or 2	Thinner sheets
3, 4, 5 and 6	Thick or multiple sheets

3. Set the paper feed selector to the "⬚ PULL" position. The display briefly shows "TRACTOR/PULL".

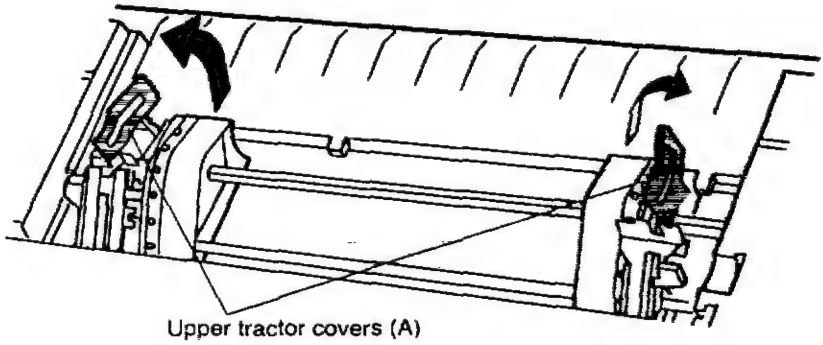


4. Open the smoked plastic cover, and then remove the top cover. (☞ P. 2-3, 2-4)

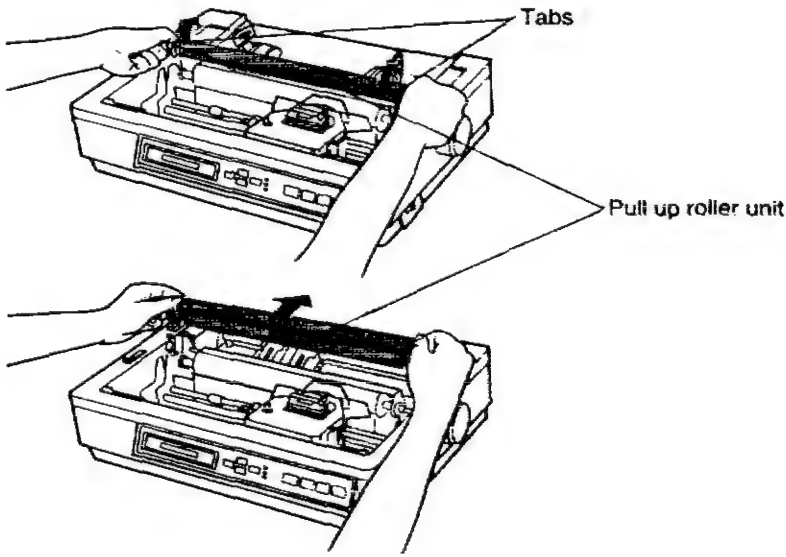
5. ❶ Unlock the tractors by pulling the tractor clamping levers forward.
❷ Slide the tractors out toward the sides to the approximate width for the required paper size.



6. Raise the upper tractor covers (A) only.



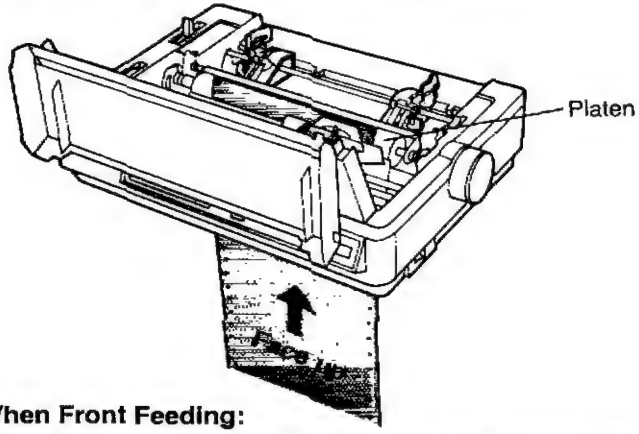
7. Remove the pull up roller unit as shown below:



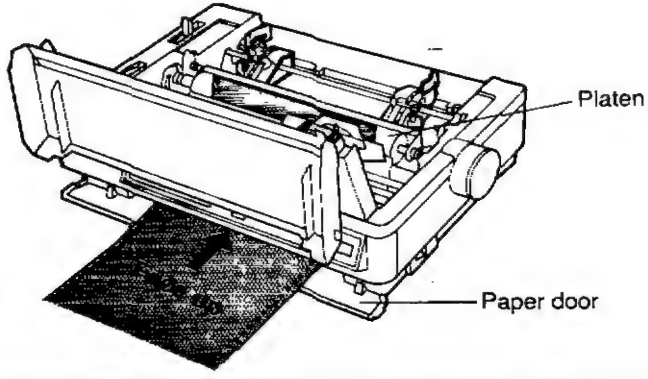
Note:

- Do not forget to remove the pull up roller unit before using PULL mode.

8. When Bottom Feeding:
Push the paper up until it appears on the platen.

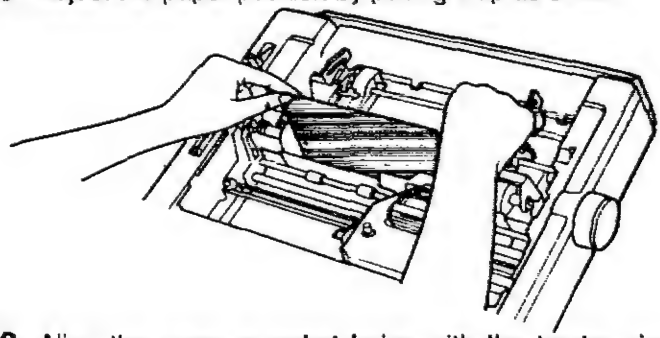


When Front Feeding:
Open the paper door on the front of the printer and insert the paper along the paper guides until it appears on the platen.

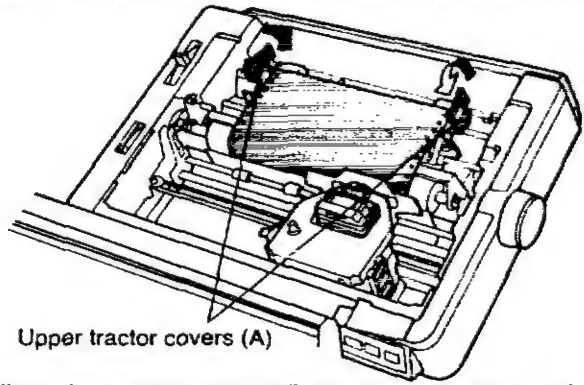


Note:
When feeding fanfold paper through the front paper door, paper types and condition, as well as temperature and humidity conditions may effect accurate line feeding and print quality may not be optimum. For optimum output bottom feed is recommended.

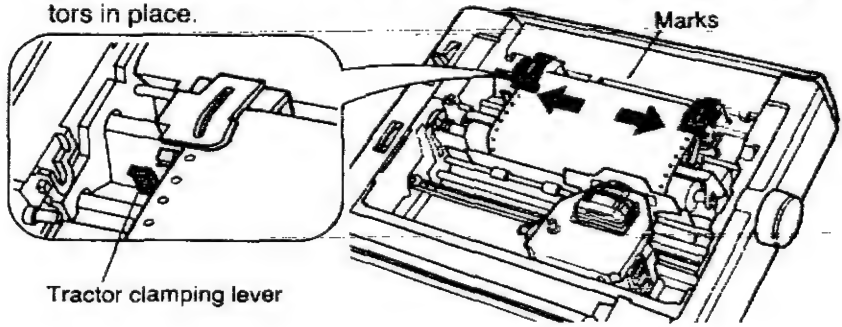
9. Adjust the paper position by pulling it up as shown.



10. Align the paper sprocket holes with the tractor pins. Verify the paper is straight and close the upper tractor covers (A).



11. Adjust the tractors accordingly to remove any slack. Align the paper horizontally by using the marks on the rear cabinet as a guide. Press back on the tractor clamping levers locking the tractors in place.



12. Replace the pull up roller unit.

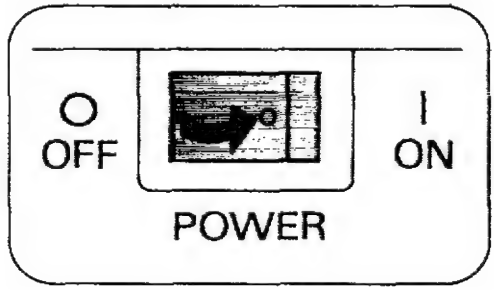
13. Replace the top cover, and then close the smoked plastic cover.

14. You can now adjust your Top of Form position (☞ P. 3-7) or press the [ON LINE] switch to get ready to print.

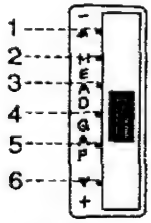
Note:
- In the pull tractor mode, reverse feed functions will not feed paper correctly and the resulting printout may not be correct. If reverse feeding is necessary in pull mode, set **REV LF/PULL** in the **INSTALL** menu to **ON** through the Function mode. (☞ P. 3-36)

Single Sheets and Envelopes—Front Feeding and Top Feeding (Friction)

1. Turn the power switch on. A beep will sound and the PAPER OUT indicator will flash. This indicates that there is no paper installed in the printer.



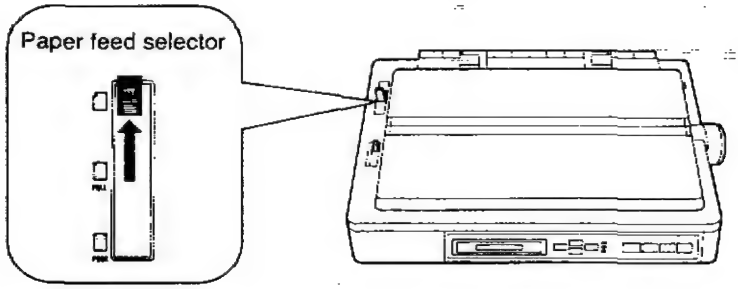
2. Set the head gap lever to the appropriate position for the thickness of the paper being used. (☞ P. 2-11)



Head gap lever

Position	Used for
1 or 2	Thinner sheets
3, 4, 5 and 6	Thick sheets or Envelopes

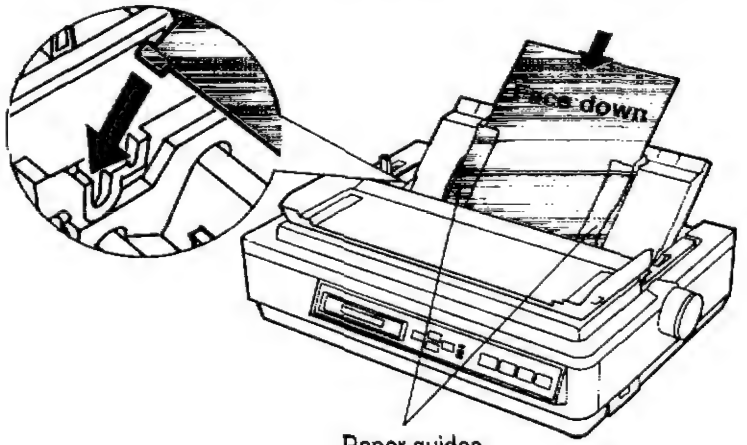
3. Set the paper feed selector to the "□" position. The display briefly shows "FRICTION".



4. When Top Feeding

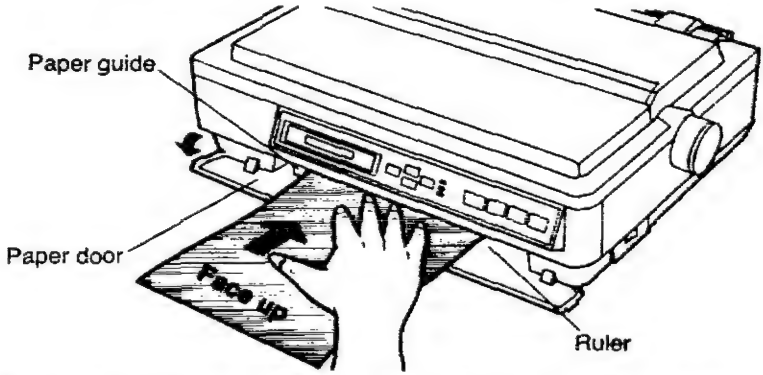
Fold the rear part of the smoked plastic cover over the front part, and place the top cover to the position as shown below.

Separate the paper guide to the approximate width of your paper or envelope. Insert the paper behind the platen as shown below. The paper will be loaded automatically to the first print line.



When Front Feeding

Open the paper door and begin inserting the paper. Slide the front paper guide against the paper's edge to insure proper alignment and paper position (the printer will print between 0 and 90 on the ruler when the print width is set to 90 through the Function mode). Continue to guide the paper with your finger tips into the printer until you feel resistance. The paper will be loaded automatically to the first print line.



5. To align the paper horizontally or vertically, set the paper feed selector to the "⬚ PULL" position. This releases the paper and allows the paper to be positioned manually as required. Set the selector back to the "⬚" position before printing.

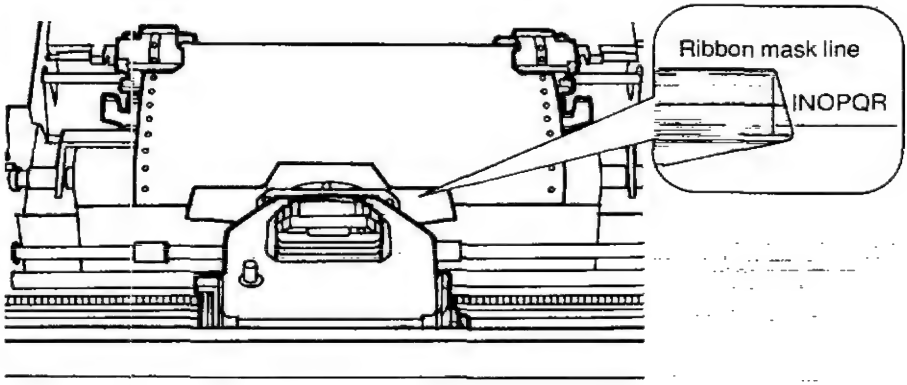
6. You can now adjust your Top of Form position (☞ P. 3-7) or press the [ON LINE] switch to get ready to print.

Note:

- If the paper is not loaded automatically, press the [⬇] (LOAD/PARK) switch.
- When the paper feed selector is in the "⬚" position, the buzzer will sound to inform you that the selector is in the wrong position.
- When loading an envelope, if the envelope will not load smoothly, move the paper feed selector to the "⬚ PULL" position and insert the envelope manually, then move the selector back to the "⬚" position.
- When printing on envelopes or thick sheets, front feeding is recommended.

Characters Alignment

The center of all characters printed on this printer will be aligned with the ribbon mask line (RML).
The RML is a useful marker that shows you exactly where your print line is located.



Note:
- Remember that once you rotate the platen knob, the top of form (TOF) will no longer be recognized.

2

Entering Control Codes through Commercial Software Packages

Many computer users do not have the time, the expertise, or the interest to develop software suited for their applications. In such cases software written by professionals can be purchased. Such software should be selected not only to meet the needs of the user, but must also be compatible with both computer and printer.

Commercial software is often written with what is called a Printer Driver. A driver is that part of the software that allows the user to configure the package to the type of printer (based on emulation or compatibility setting) and interface being used. Once the software has been booted, the user is generally requested to supply additional information such as:

Brand/Model/Emulation mode of printer being used.
I/O port being used. (eg: LPT1:, if a parallel interface is being used.)
Baud rate, parity, etc. if a serial interface is being used.

But how do you know which mode to choose? The major factor to consider is which printer your software supports. Most commercial software packages include printer drivers that support one or more of the printers that this printer can emulate.

Printer Selection

The installation program usually offers a menu of printers from which to choose. If you find this printer on the menu, select it.

1. Choices in order of priority: [If you set the EMULATION menu to EPSON through the Function mode].
   We recommend that you inspect your software first. If it offers a menu of supported printers, select the printer mode in this order of preference:

   a. Panasonic KX-P2124 (with color option)
   b. Panasonic KX-P1124*i*
   c. Epson LQ-860 (with color option)
   d. Epson LQ-2550
   e. Epson LQ Series

2. Choices in order of priority (IBM mode)

   a. IBM Proprinter X24E

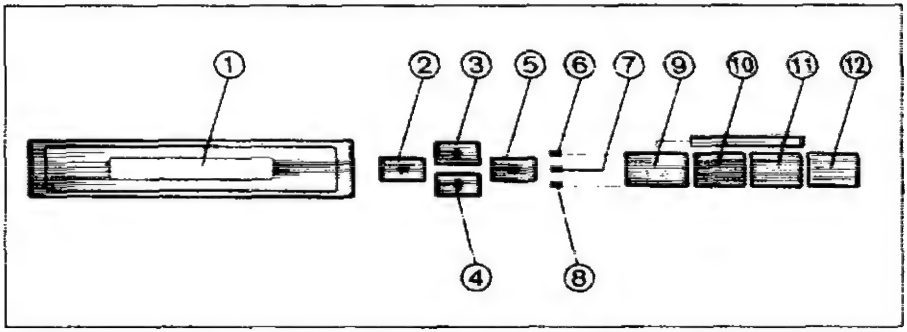
Once the necessary information has been supplied, the software will provide the computer with the control codes and other data needed by this printer.

Many word processing packages will request that you enter the ASCII codes used by this printer for special settings such as underlining, compressed print, super- and subscript, italics, etc. In all cases you should refer to your software instruction manual for the proper use of the package with this printer.

EZ Set Operator Panel

This printer has 8 switches, 3 indicators and a 16-character LCD on the EZ Set Operator Panel. These switches allow you to configure your printer to communicate properly with the computer and to set the desired print conditions through the mode called the Function mode. (☞ P. 3-9—3-41)

EZ Set Operator Panel Switches/Indicators/LCD



① 16-character Liquid Crystal Display (LCD)

This printer has a 16-character LCD to prompt the user with messages and instructions. When you make your settings using the front panel, these messages will guide the operation.

In case of any errors in the printer, the display will immediately indicate the appropriate error messages so you may take corrective action. (☞ P. 9-5, 9-6)

②, ⑦ SUPER QUIET (←) Switch and SUPER QUIET Indicator

Pressing this switch reduces print noise, however it also reduces the printing speed. When it is active, the SUPER QUIET indicator is lit and the display briefly shows "QUIET MODE=ON".

SUPER QUIET

In the Function mode, this switch scrolls back through the Main menu, the Sub-menu and the selections or conditions of the item.

③ TEAR OFF (↑) Switch

Pressing this switch advances or reverses the paper for tearing off in the OFF LINE mode or when not printing in the ON LINE mode. (☞ P. 3-5)

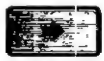
In the Function mode, this switch returns you to the previous menu level such as "Selection → Sub-menu → Main menu".

④ LOAD/PARK (↓) Switch

This switch loads/parks the paper in the OFF LINE mode or when not printing in the ON LINE mode.

In the Function mode, this switch lets you scroll down to the next menu level such as "Main menu → Sub-menu → Selection".

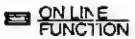
⑤ TOF SET (→) Switch



This switch allows you to set the Top of Form in the OFF LINE mode or when not printing in the ON LINE mode. (☞ P. 3-7)

In the Function mode, this switch scrolls through the Main menu, the Sub-menu and the selections or conditions of the item.

⑥ ON LINE/FUNCTION Indicator



This indicator is lit when the printer is in the ON LINE mode, and in the OFF LINE mode, the indicator is out.

In the Function mode, the indicator blinks.

⑧ POWER/PAPER OUT Indicator

This indicator is lit when the power switch is turned on and paper is installed. When an out of paper condition occurs, the POWER/PAPER OUT indicator starts blinking.

⑨ ON LINE (FONT) Switch

FONT

This switch opens and closes the communication lines with the computer. When the power switch is turned on and paper is installed, the ON LINE indicator is lit, the display shows "ON LINE", and the printer is ready to receive data from the computer. In the OFF LINE mode, the indicator is out, the display shows "OFF LINE" and the printer can no longer receive data.

In the Function mode, this switch lets you to start from the FONT Selection with one step. (☞ P. 3-14)

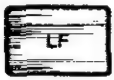
⑩ FF (PITCH) Switch

PITCH

This switch moves the carriage to the center and advances the paper to the top of the next page in the OFF LINE mode or when the printer is not printing in the ON LINE mode.

In the Function mode, this switch lets you to start from the PITCH Selection with one step. (☞ P. 3-14)

⑪ LF (SET) Switch



SET

This switch advances the paper one line. Holding the switch down performs multiple line feeds. These functions are active in the OFF LINE mode or when the printer is not printing in the ON LINE mode.

In the Function mode, this switch sets selections or conditions of the item shown on the display and returns you to the Sub-menu.

⑫ FUNCTION Switch

EXIT

This switch allows you to enter and exit the Function mode.

In the Function mode, the ON LINE/FUNCTION indicator blinks and the EZ Set Operator Panel switches have secondary capabilities (labeled in yellow), so you can set the desired print conditions. (☞ P. 3-9—3-41)

Feeding the Paper

You can adjust the paper position by using the front panel switches when the printer is in the OFF LINE mode or when the printer is not printing in the ON LINE mode.

Form Feed

Pressing the FF switch advances the paper to the next top of form position.

Line Feed

Pressing the LF switch once advances the paper one line. Holding the switch will advance the paper continuously until the switch is released.

Micro Line Feed

Pressing the FF switch **while** pressing the ON LINE switch advances the paper one micro line (1/180"). Holding the switch will advance the paper continuously until the switch is released.

Reverse Micro Line Feed

Pressing the LF switch **while** pressing the ON LINE switch reverses the paper one micro line (1/180"). The printer cannot reverse the paper past the printable area (☞ Appendix F). Holding the switch will reverse the paper continuously until the switch is released.

Note:
- In the pull tractor mode, Reverse Micro Line Feed will not feed paper correctly and the resulting print out may not be correct.
- When pressing the FF or LF switch, the amount of paper which is fed is determined by the current setting for lines per inch specified in the Function mode or software command.

This printer has other special features for paper feeding.

Tear Off (Rear feeding only)

This function allows you to advance your fanfold paper's perforation to the tear position. This is not dependent on your top of form position but is dependent on your form length. After tearing off the page you can return your paper to your top of form. This function can be automatic through the Function mode. (☞ P. 3-32, 3-37)

1. Verify the ON LINE/FUNCTION indicator is not blinking and the paper feed selector is in the "⇕ PUSH" position. (If the ON LINE indicator is blinking, press the [FUNCTION] switch to exit the Function mode.)

2. Press the [↑] (TEAR OFF) switch to advance the paper's perforation to the tear bar.

3. Open the rear part of the smoked plastic cover.

4. Tear off the page.

5. Press the [↑] (TEAR OFF) switch again to reverse the paper back to the top of form.
   —A Top of Form setting (☞ P. 3-7) past the printable area is ignored by Tear Off. Tear Off will use the Top of Form setting that was last saved.
   —If you do not press the [TEAR OFF] switch the second time, once data is received, the printer will automatically reverse the paper to the top of form position if you chose the automatic Tear Off function.

6. Close the rear part of the smoked plastic cover.

Paper Parking (Rear feeding only)

This function allows you to use single sheets or envelopes without removing or wasting your fanfold paper (in Push tractor mode).

Parking the fanfold paper:

1. Tear off the printed pages. (☞ P. 3-5)

2. Verify the printer is in the OFF LINE or ON LINE mode.
   (If the ON LINE/FUNCTION indicator is blinking, press the FUNCTION switch.)

3. Press the (↓) (LOAD/PARK) switch. The printer will reverse the fanfold paper to the parked position.
   While the paper is going back, the display shows "PAPER BACK", and when the paper is parked, the display shows "PAPER OUT", with the PAPER OUT indicator blinking. If the printer is in the ON LINE mode, it automatically goes back to the OFF LINE mode.

Loading the cut sheet paper: (☞ Paper installation section: Single Sheets and Envelopes page 2-23—2-25)

1. Move the paper feed selector to the "□" position. The display briefly shows "FRICTION".

2. **Front Feeding:**
   Open the paper door and begin inserting the paper. Slide the front paper guide against the paper's edge to insure proper alignment and paper position.Continue to guide the paper into the printer until you feel some resistance. **The printed side should face up**.

   Top Feeding:
   Raise the top cover. Separate the paper guides to the approximate width of your paper. Insert the paper through the paper guides and behind the platen. **The printed side should face down**.

The printer will load the paper to the first print line automatically. If not, press the (↓) (LOAD/PARK) switch.

3. Press the [ON LINE] switch to enable printing. The ON LINE indicator will be lit and the display will show "ON LINE".

4. When you are finished printing, remove the sheet from the printer by rotating the platen knob.

5. **Front Feeding**:
   Close the paper door.
   Top Feeding:
   Lower the top cover.

Reloading the fanfold paper:

1. Move the paper feed selector to the "⇳ PUSH" position.

2. Press the [⬇] (LOAD/PARK) switch to advance the fanfold paper to the top of form previously set for this paper path.
   (☞ "Top of Form Function")

Top of Form Function

This printer allows you to set and store the first print line position and load the paper to the designated position automatically. The first print line position will be stored even after the power is turned off. A page is defined by setting the page length through the Function mode or the software command.

Additionally, the printer can store the 3 different top of form positions depending on the paper feed method [fanfold paper (⇳ PUSH), single sheet (⇱), and single sheet with the Cut Sheet Feeder option: KX-PT11].

To Set the Top of Form:

1. Set the page length of the paper you are using through the Function mode (☞ P. 3-15—3-17) or software commands (☞ P. 6-24, 7-20).

2. Verify the printer is in the OFF LINE or ON LINE mode. (If the ON LINE/FUNCTION indicator is blinking, press the FUNCTION switch.)

3. Load the paper by pressing the ↓ (LOAD/PARK) switch.
   —The paper type you insert determines the first print line position for that type. (If using single sheets, you set the top of form for single sheets.)
   —The printer **stores** the 3 kinds of top margins concurrently.

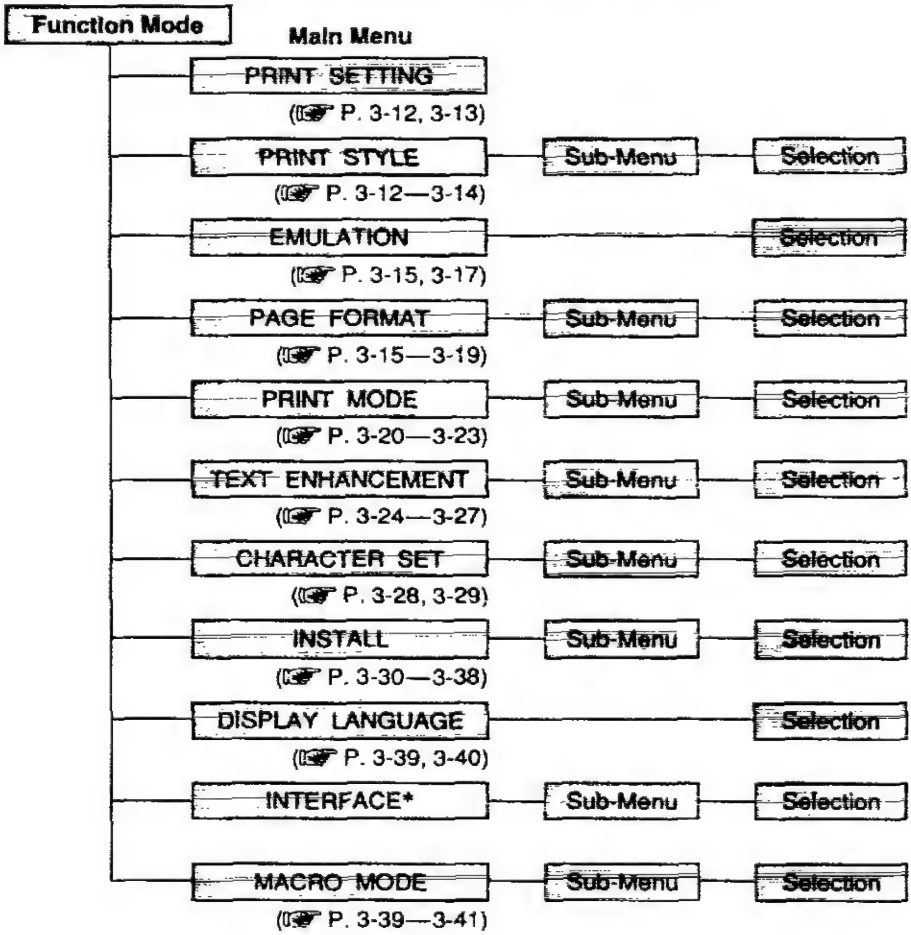
4. Adjust the paper position by using Line Feed, Micro Line Feed, or Reverse Micro Line Feed. (☞ P. 3-4)
   —**Do not rotate the platen knob, the printer will not be able to count the number of lines.**

5. Press the → (TOF SET) switch to set the Top of Form for the current position.
   —A Top of Form position (below 5 inches from the top of page) will be saved even after the power is turned off. Pressing the ↓ (LOAD/PARK) switch will advance the paper to the most recently saved Top of Form setting.
   —A Top of Form position set in the area greater than 5 inches will not be saved after the power is turned off, after parking the paper, or after using Tear Off.

Note:
- **Temporary Top of Form setting is indicated by one beep. Saved Top of Form setting is indicated by two beeps.**
- When you use fanfold paper, the Top of Form position must be set on the first page because the printer does not accept a top margin which is longer than one page.

Function Mode

You can control a wide variety of printing conditions through the Function mode. The Function mode is composed of a Main menu and Sub-menus that allow you to select modes and parameters.
These menus are diagrammed in the following flow chart.

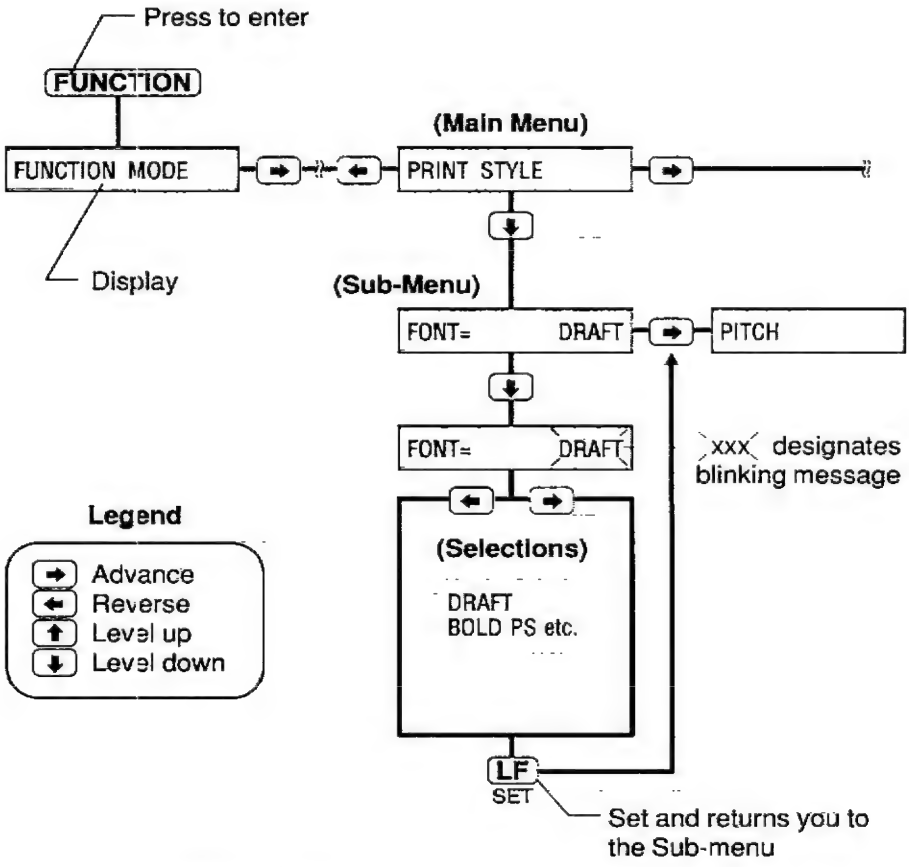


* The INTERFACE menu is only displayed when the optional KX-PS14. RS-232C Serial interface board is installed. (☞ P. 2-9)

Operation Flow Chart

The menus and the switches which should be used are diagrammed in the following flow chart. This will help you to find the menu you wish to select and set.

Description of the Flow Chart



- Press FUNCTION to exit.

Selecting Function Mode Features

1. Press the [FUNCTION] switch to enter the Function mode. The display briefly shows "FUNCTION MODE" and the ON LINE/ FUNCTION indicator blinks.

2. There are three (3) menu levels shown on the display.
   a. Main menu—example; PRINT STYLE
   b. Sub-menu—example; FONT
   c. Selections menu—example; DRAFT

   To access the topics in each of the three (3) menu levels, use the [←] / [→] switches.

3. After scrolling to the appropriate Main menu topic (ex; PRINT STYLE), press the [↓] switch to enter the desired Sub-menu (ex; FONT). A status message will appear (ex; FONT= DRAFT) to reflect the current setting.

4. To change the current status you must enter the selection menu by pressing the [↓] switch. The message will blink.

5. To view the other selections, press the [←] / [→] switches.

6. To set the selection and return to the Sub-menu, press the [LF] (SET) switch.

7. To make other changes within the current Sub-menu, use the [←] / [→] switches. When at desired Sub-menu (ex; PITCH), repeat steps 4 through 6. If changes must be made to another Main menu topic, press the [↑] switch once and repeat steps 3 through 6.

8. When all selections have made, press [FUNCTION] switch to exit the Function mode.

- **This example can be used for setting any print selection**. For direct access to FONT/PITCH please see page 3-14 for more details.
- All settings made are temporary unless saved in Macro.
- Temporary settings are lost when power is turned off.
- The desired settings when power is turned on should be stored as POWER ON MACRO. (☞ P. 3-39, 3-41)

PRINT SETTING Menu

(To Print Out the Function mode Settings)

Before you change the Function mode settings, you can verify the settings by printing them.

When you print out

Current settings only—Press the [LF] (SET) switch after selecting the **PRINT SETTING** Main menu.

All the settings (current, MACROs, Factory)—Press the [↓] switch after selecting the **PRINT SETTING** Main menu.

(☞ P. 3-13)

PRINT STYLE Menu

(To Change the Font/Pitch)

FONT

This Sub-menu in the **PRINT STYLE** Main menu will allow you to select and set a desired font. This printer has draft, 8 LQ (Letter Quality) and 1 Super LQ fonts. (☞ P. 3-13) If you want to see all of the font samples, use the Self Test feature on page 2-7.

PITCH

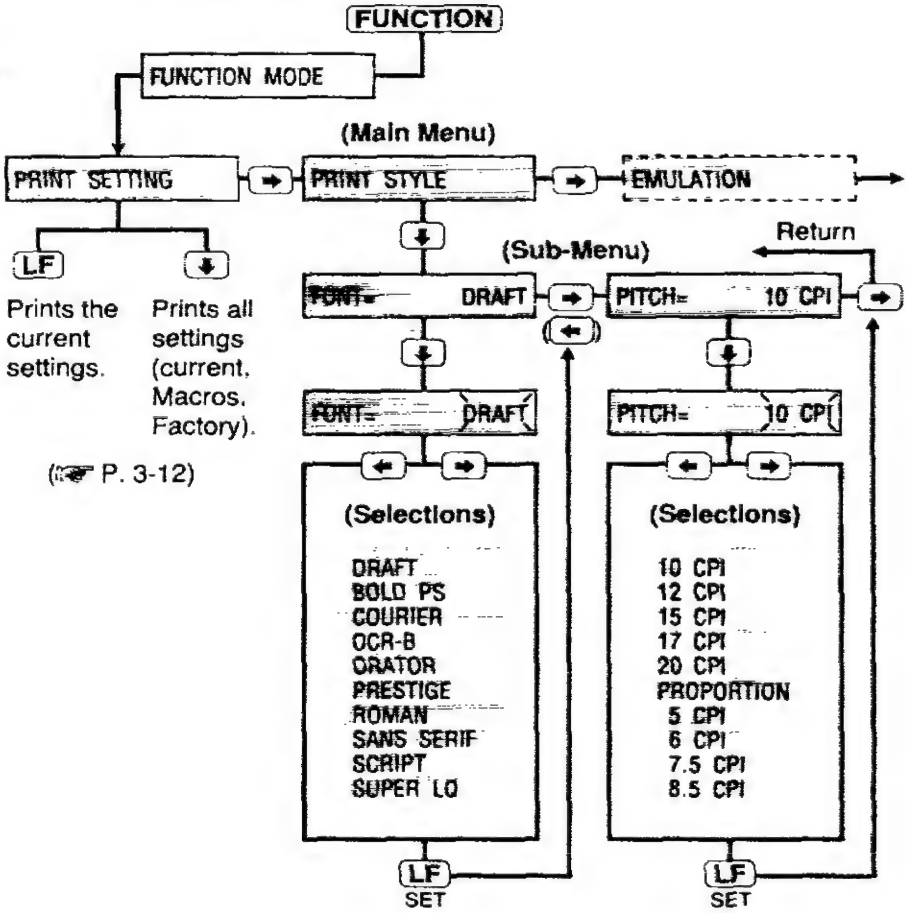
This Sub-menu in the **PRINT STYLE** Main menu will allow you to select and set a desired pitch. (☞ P. 3-13) This printer has 10 pitch selections. (☞ P. 5-2)

- **For direct access to font and pitch setting, see page 3-14.**
- **To activate the above setting, be sure to see "PANEL LOCK".** (☞ P. 3-21)

Note:

- The Draft font when combined with Proportional spacing is a *restricted combination and should not be used.*
- The Super LQ font can only be combined with 5, 6, 10 and 12 cpi.
- The OCR-B font should only be used with 10 cpi.

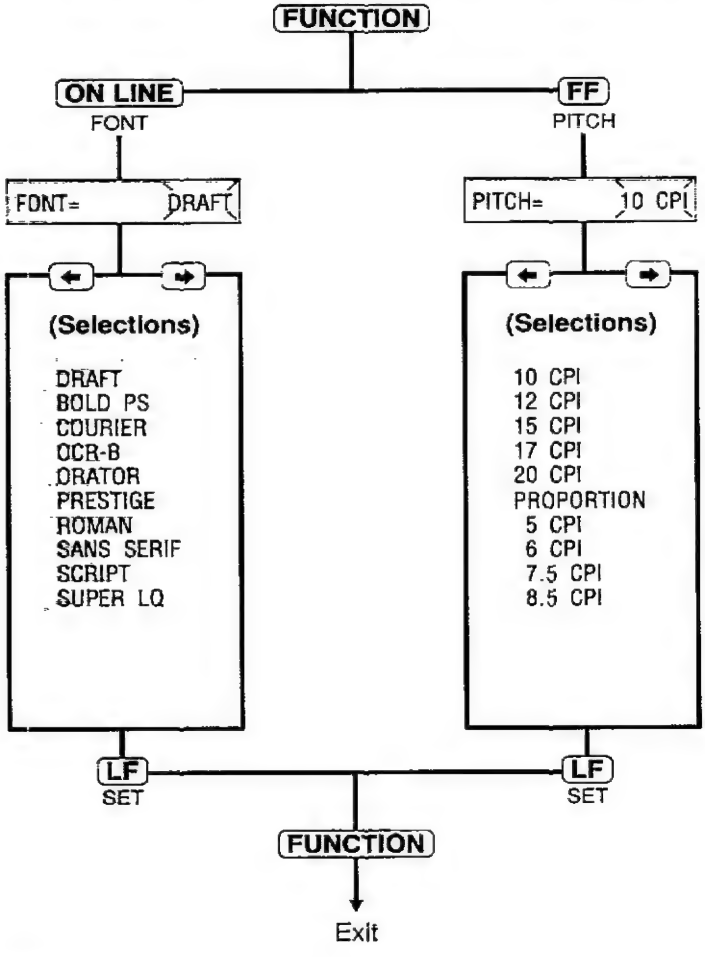
- Press [FUNCTION] to exit.



Note:

- [↑] returns you to the previous menu level.
- Factory settings are indicated in the Sub-menus.
- xxx designates blinking message.

Direct Access Chart to Font and Pitch Setting



Note:
- ↑ returns you to the previous menu level.
- Factory settings are indicated in the Sub-menus.
- "Xxx" designates blinking message.

EMULATION Menu

(To Change Your Printer's Emulation)

This printer can emulate the Epson LQ-860 or the IBM Proprinter X24E. Select and set either one in the **EMULATION** Selection. (☞ P. 3-17)

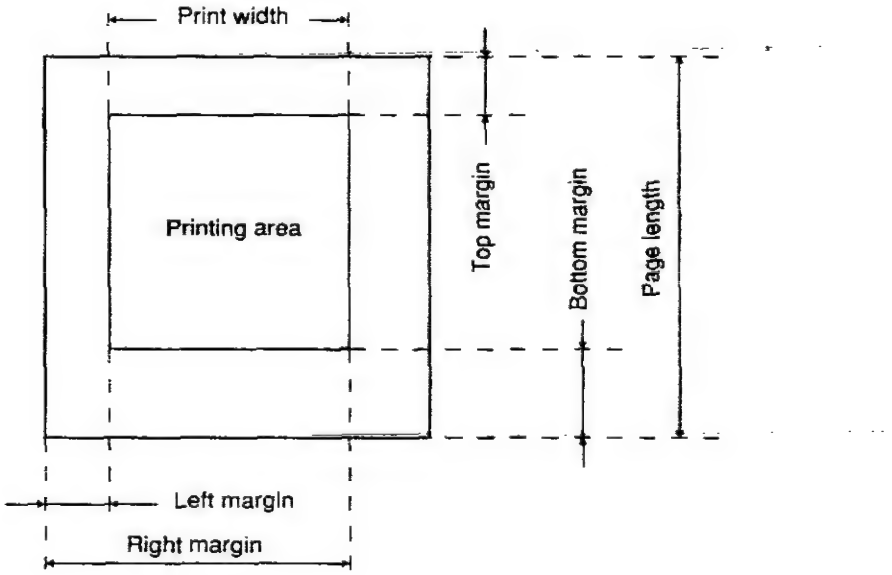
PAGE FORMAT Menu

(To Change the Lines Per Inch/Page Format)

LINES/INCH

This Sub-menu in the **PAGE FORMAT** Main menu will allow you to change lines per inch. (☞ P. 3-17)

Page formatting is determined by the page length, left/right margin (which sets the margin on the left/right side of the paper) and top/bottom margin (which sets the margin on the upper/lower end of the paper) as shown below.



Select and set the number you wish of the following Sub-menus in the **PAGE FORMAT** Main menu.

Sub-Menu		Sub-Menu	
P.LENGTH	Page length	L.MRGN	Left margin
T.MRGN	Top margin	R.MRGN	Right margin
B.MRGN	Bottom margin	CTR PRINTHEAD	Centering

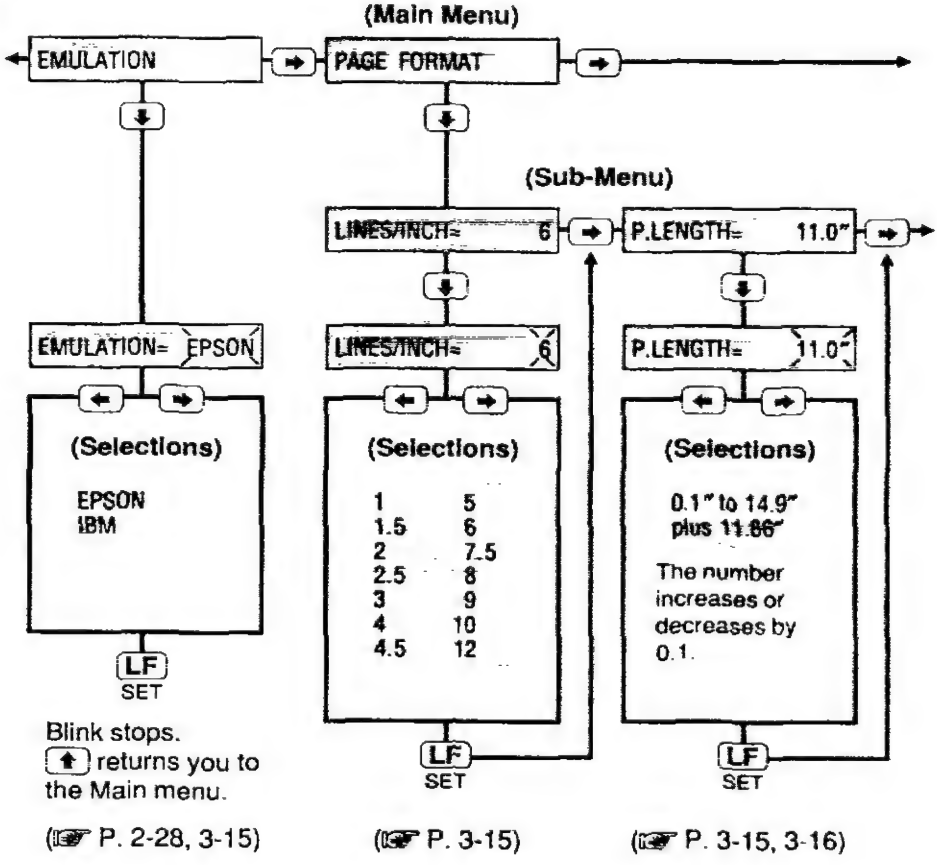
(☞ P. 3-17—3-19)

- To change the **print width**:
  Select the **PRINT WIDTH** Sub-menu in the **PRINT MODE** Main menu.
  (☞ P. 3-22)

Note:

- When you change the left/right margin, the ← / → switch moves the carriage right or left. Pressing the ← / → switch when the carriage reaches the end of the platen moves it to the opposite side. This is helpful in moving the carriage to the second margin position when the first is far from it.
- You can set either the left or the right margin first.
- If the left margin is set to the right of the right margin, the right margin is reset to 80 (10 cpi) automatically.
- The skip perforation command overrides the front panel Bottom margin setting.
- When the **PRINT WIDTH** is changed, the left margin will default to 0" and the right margin will default to 8" or 9" automatically depending on your selection of the print width. Please refer to chart on page E-2 for the Maximum number of characters per line according to your pitch selection.
- The center position is default to 40". If it doesn't fit in your printable area, you can change it through the **CTR PRINTHEAD** Sub-menu in the **PAGE FORMAT** Main menu.

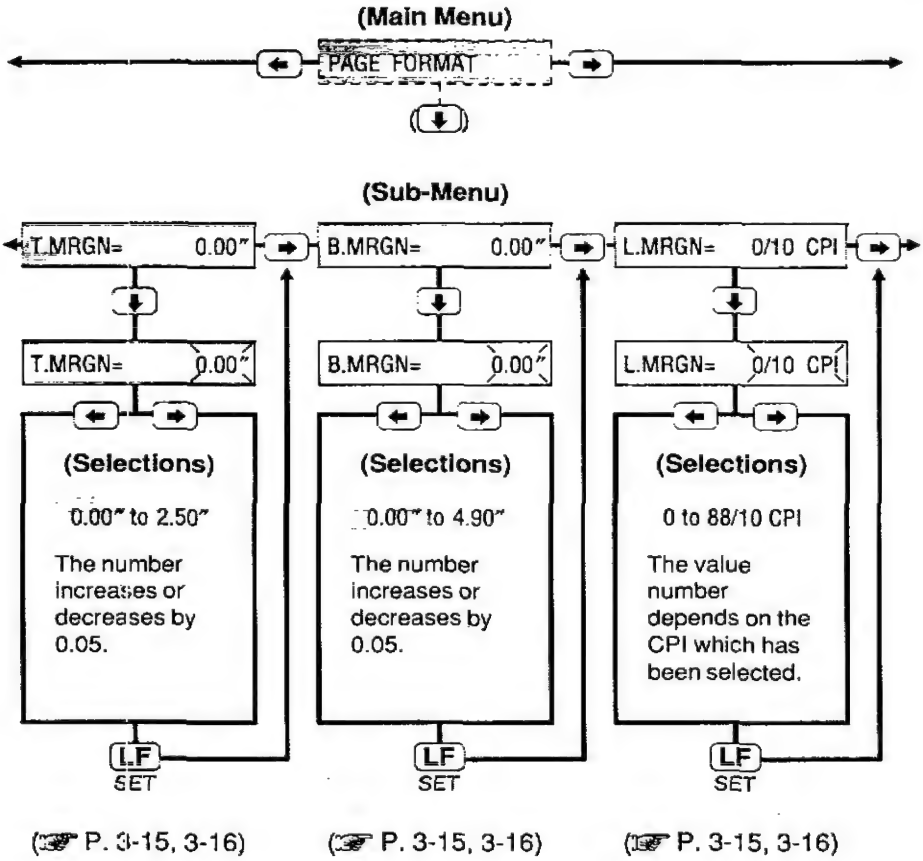
- Press [FUNCTION] to enter/exit.



Note:

- [↑] returns you to the previous menu level.
- Factory settings are indicated in the Sub-menus.
- xxx designates blinking message.

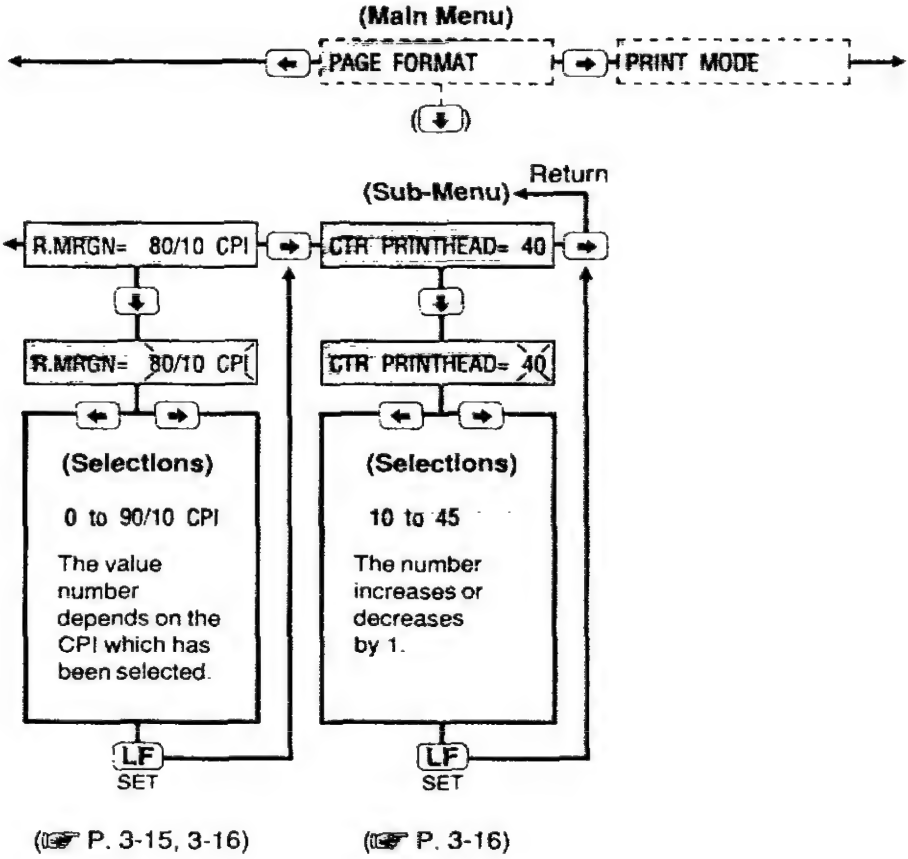
- Press **FUNCTION** to enter/exit.



(☞ P. 3-15, 3-16) (☞ P. 3-15, 3-16) (☞ P. 3-15, 3-16)

Note:
- ↕ returns you to the previous menu level.
- Factory settings are indicated in the Sub-menus.
- "XXX" destonates blinking message.

- Press [FUNCTION] to enter/exit.



(☞ P. 3-15, 3-16)

(☞ P. 3-16)

Note:

- [↑] returns you to the previous menu level.
- Factory settings are indicated in the Sub-menus.
- xxx designates blinking message.

PRINT MODE Menu

(To Change Print Direction etc.)

This printer allows you to select print direction in graphics and text. When you print graphics such as tables, set the **G.DIRECTION** Sub-menu to **UNI**. This will provide precise vertical alignment. Setting to **BI** reduces printing time, however the vertical alignment may not be as precise.

- Graphics:

Sub-Menu	Selections	Function
G.DIRECTION	UNI	Prints left-to-right only
	BI	Prints in both directions

(☞ P. 3-22)

- Text:

Sub-Menu	Selections	Function
T.DIRECTION	UNI	Prints left-to-right only
	BI	Prints in both directions

(☞ P. 3-22)

PRINT WIDTH

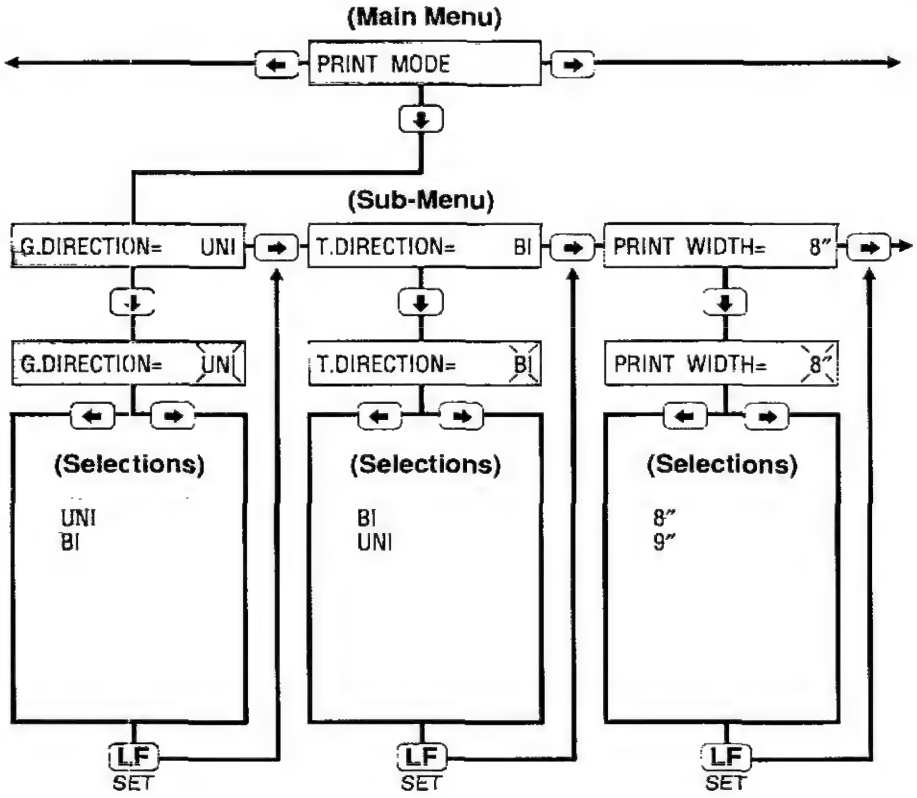
This Sub-menu in the **PRINT MODE** Main menu will allow you to change the print width. (☞ P. 3-22)

PANEL LOCK

This Sub-menu in the **PRINT MODE** Main menu will allow you to decide the priority between the printer's front panel settings and the software commands. This **PANEL LOCK** Sub-menu is set to **OFF** when shipped which allows the software commands to override the printer's front panel settings.

To activate the printer's
Font only—Set **PANEL LOCK= FONT**
Pitch only—Set **PANEL LOCK= PITCH**
Font and Pitch only—Set **PANEL LOCK= F&P**
All settings—Set **PANEL LOCK= ALL**
(☞ P. 3-23)

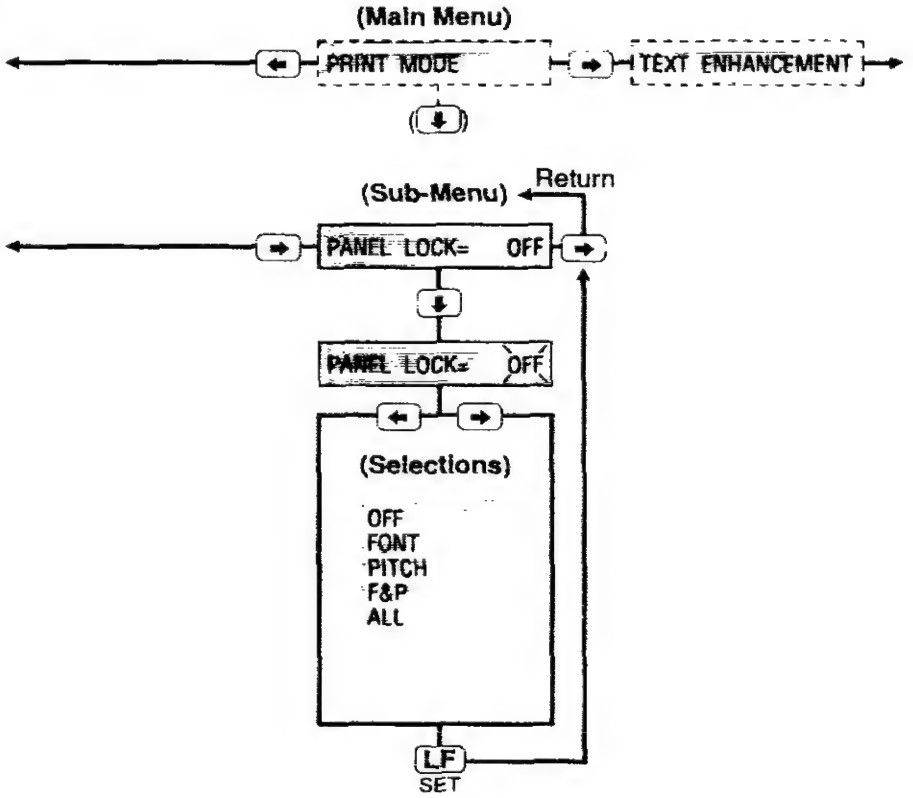
- Press **FUNCTION** to enter/exit.



(☞ P. 3-20) (☞ P. 3-20) (☞ P. 3-21)

Note:
- ↑ returns you to the previous menu level.
- Factory settings are indicated in the Sub-menus.
- "xx" designates blinking message.

- Press FUNCTION to enter/exit.



(☞ P. 3-21)

Note:

- ↑ returns you to the previous menu level.
- Factory settings are indicated in the Sub-menus.
- xxx designates blinking message.

TEXT ENHANCEMENT Menu

(To Enhance Your Text)

This printer allows you to have a variety of print styles using the following enhancements. Also Sub-menus in the **TEXT ENHANCEMENT** Main menu selected for each enhancement are shown below. Any enhancements can be set to **ON** (able) or **OFF** (disable).

Sub-Menu	Enhancement	Sub-Menu	Enhancement
BOLD	Bold	ITALICS	Italics
DBL HIGH	Double high	OUTLINE	Outline
DBL STRIKE	Double strike	SHADOW	Shadow
DBL WIDE	Double wide		

(☞ P. 3-25—3-27)

- Enhancements are independent and are set individually, therefore, **any enhancement can be set with another.**
- Page 5-4 gives you a sampling of the features.

ZERO FONT

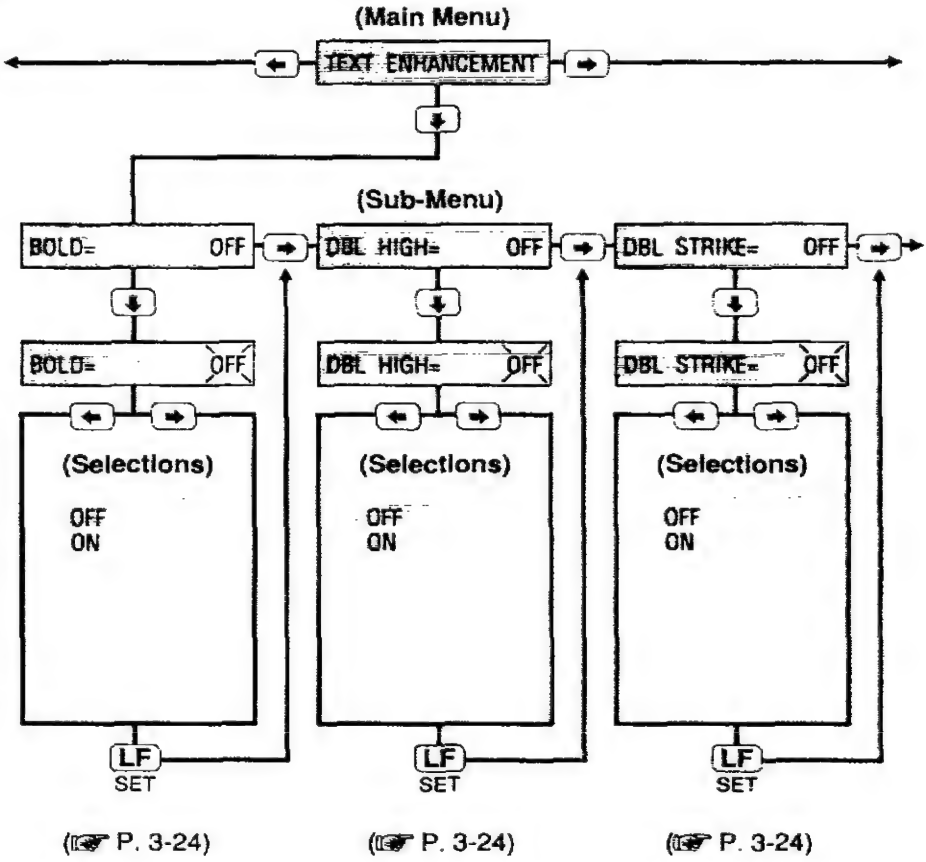
This is a Sub-menu in the **TEXT ENHANCEMENT** Main menu.
This mode will allow you to set one of the following zero font selections.
Numeral "0" and alphabet "O" are very similer. To distinguish between them easily in a document, print "0" or "Ø" instead of normal zero. Select and set one of the following in the **ZERO FONT** Submenu.

Selections	Zero font
NORMAL	0
POINT	0
SLASH	Ø

(☞ P. 3-27)

- When the international character set is set to Norway, zero slash is printed as 0.

- Press [FUNCTION] to enter/exit.

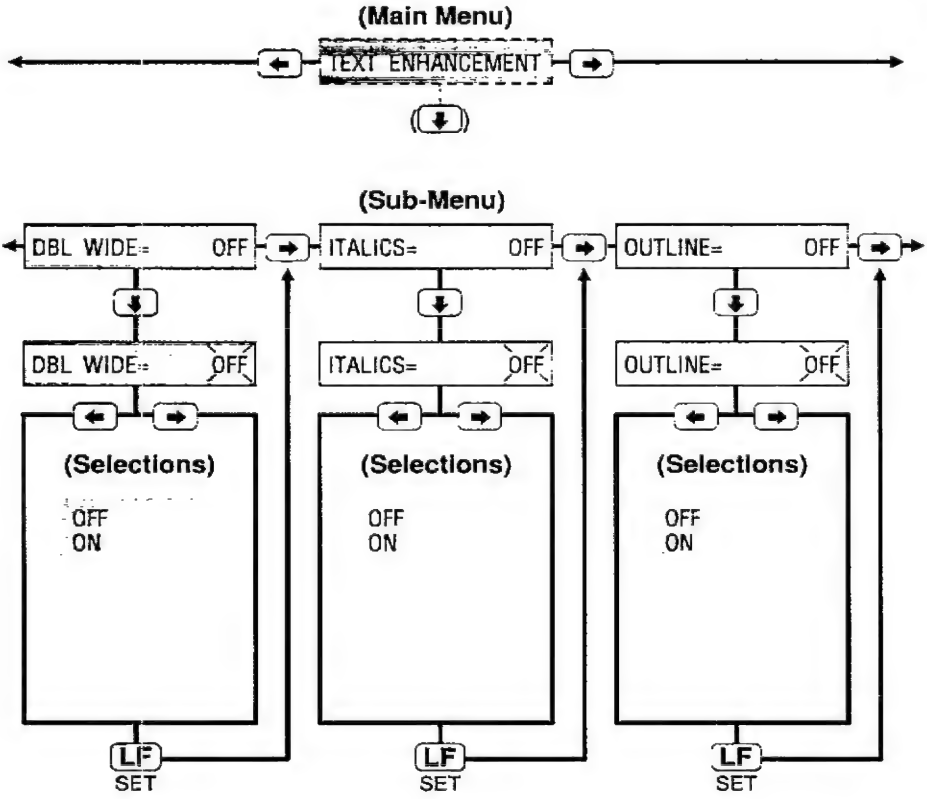


(☞ P. 3-24) (☞ P. 3-24) (☞ P. 3-24)

Note:

- [↑] returns you to the previous menu level.
- Factory settings are indicated in the Sub-menus.
- `xxx` designates blinking message.

- Press FUNCTION to enter/exit.

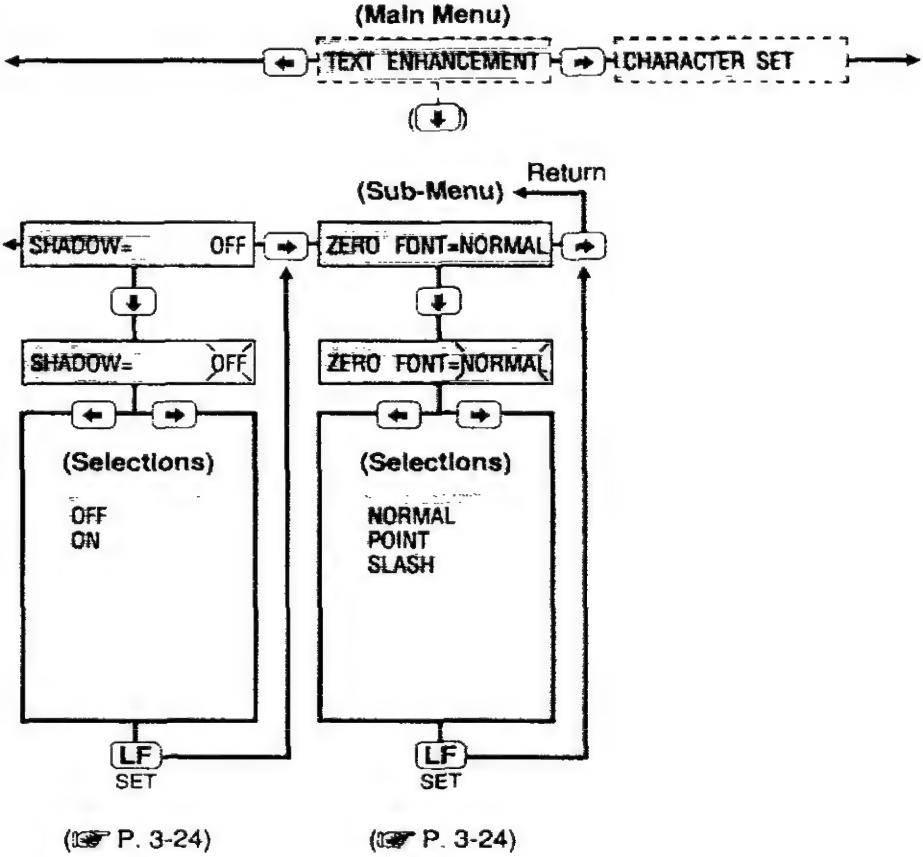


(☞ P. 3-24) (☞ P. 3-24) (☞ P. 3-24)

Note:

- ↑ returns you to the previous menu level.
- Factory settings are indicated in the Sub-menus.
- XXX designates blinking message.

- Press [FUNCTION] to enter/exit.



(☞ P. 3-24) (☞ P. 3-24)

Note:
- [↑] returns you to the previous menu level.
- Factory settings are indicated in the Sub-menus.
- xxx designates blinking message.

CHARACTER SET Menu

(To Change the Character Set)

COUNTRY

This Sub-menu in the **CHARACTER SET** Main menu will allow you to set one of the following international character set selections.

Selections	Character set	Selections	Character set
USA	USA	LTN AMER	Latin America
DENMARK1	Denmark 1	LEGAL	Legal
DENMARK2	Denmark 2	NORWAY	Norway
FRANCE	France	SPAIN1	Spain 1
GERMANY	Germany	SPAIN2	Spain 2
ITALY	Italy	SWEDEN	Sweden
JAPAN	Japan	UK	England
KOREA	Korea		

(☞ P. 3-29)

CHR SET

This Sub-menu in the **CHARACTER SET** Main menu will allow you to set one of the following character set selections.

Selections	Character set	
ITALIC	Italic	Epson mode only
GRAPH1	Graphic 1	Epson or IBM mode
GRAPH2	Graphic 2	

(☞ P. 3-29)

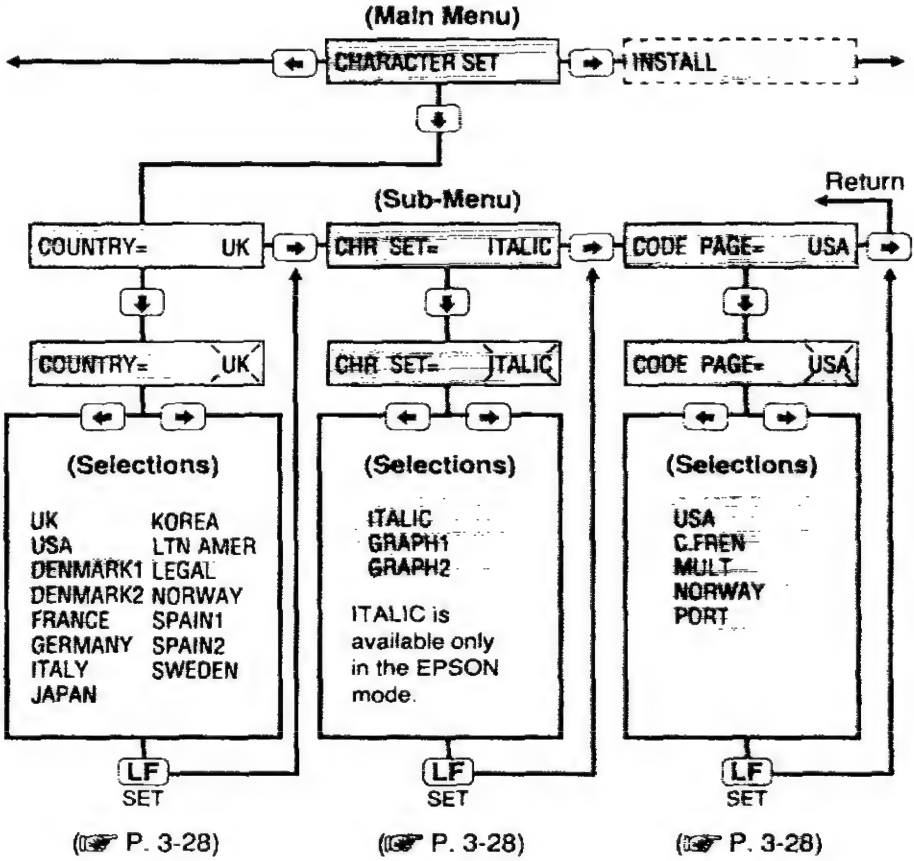
CODE PAGE

This Sub-menu in the **CHARACTER SET** Main menu will allow you to set one of the following code page selections.

Selections	Code page	Selections	Code page
USA	USA	NORWAY	Norway
C.FREN	Canadian French	PORT	Portugal
MULT	Multilingual		

(☞ P. 3-29)

- Press FUNCTION to enter/exit.



(☞ P. 3-28) (☞ P. 3-28) (☞ P. 3-28)

Note:

- ↑ returns you to the previous menu level.
- Factory settings are indicated in the Sub-menus.
- xxx designates blinking message.

INSTALL Menu

(To Control Initial Setup Conditions)

Alternate Graphic Mode

Sub-Menu	Selections	Function
AGM/IBM	ON	Sets Alternate Graphic Mode
	OFF	Releases Alternate Graphic Mode

—Effective in the IBM mode only. (☞ P. 3-34)

Automatic CR

Sub-Menu	Selections	Function
AUTO CR/IBM	ON	Activates Automatic CR on LF, VT, ESC+"J"
	OFF	Prevents Automatic CR on LF, VT, ESC+"J"

—Effective in the IBM mode only. (☞ P. 3-34)

Automatic LF

Sub-Menu	Selections	Function
AUTO LF	ON	Activates CR+LF
	OFF	Activates CR only

(☞ P. 3-34)

INSTALL Menu (continued)

Automatic Paper Loading

This feature loads a single sheet or an envelope to the first print line automatically when it is installed.

Sub-Menu	Selections	Function
AUTO LOADING	ON	Automatic loading is available
	OFF	Automatic loading is not available

(☞ P. 3-35)
—This setting is ineffective when using the Cut Sheet Feeder.

Buzzer Sound Control

Select and set **ON** (sounds) or **OFF** (doesn't sound) in the **BUZZER** Sub-menu. (☞ P. 3-35)

Data length

Select and set **8 BIT** or **7 BIT** in the **D.LENGTH** Sub-menu.
(☞ P. 3-35)

Paper Out Detector

When the **P.O.DETECT** Sub-menu is **ON**, the printing stops once the paper is no longer under the platen.
To avoid this and print to the end of the paper, set the **P.O.DETECT** Sub-menu to **OFF**. (☞ P. 3-36)

INSTALL Menu (continued)

Super Quiet Printing

This feature reduces printing noise, however, it also reduces the printing speed.

Sub-Menu	Selections	Function
QUIET MODE	ON	Activate Quiet mode
	OFF	Deactivate Quiet mode

(☞ P. 3-36)

Reverse Feeding in Pull Mode

When you control reverse feeding in pull mode, select and set **ON** (able) or **OFF** (disable) in the **REV LF/PULL** Sub-menu. (☞ P. 3-36)

Automatic Tear Off

This feature loads the fanfold paper's perforation to the tear off position automatically.

Sub-Menu	Selection	Function
TEAR OFF	AUTO	Automatic Tear Off
	MANUAL	Manual Tear Off (using TEAR OFF switch)

(☞ P. 3-37)

Cut Sheet Feeder Mode

CSF MODE

This Sub-menu will allow you to use the Cut Sheet Feeder (**ON**). This menu should be **OFF** when not in use. (☞ P. 3-37)

(This setting is effective only when the paper feed selector is in "▭" position and C.S.F. option (KX-PT11) is installed. (☞ C.S.F. manual)

INSTALL Menu (continued)

Download Buffer Control

After installing the 32K buffer chip (KX-P43), if you need downloading, set the **OPT RAM** Sub-menu to **DOWNLOAD**. If you need buffering, set it to **BUFFER**.

Sub-menu	Selection	Function
OPT RAM	BUFFER	Uses option RAM as a receiving buffer
	DOWNLOAD	Uses option RAM as a download font area

[This setting is effective only when the 32K buffer option (KX-P43) is installed.]
(☞ P. 3-37)

Color Printing

Before you use this function, make sure that the color kit (KX-PCK11) is installed in the printer.

COLOR

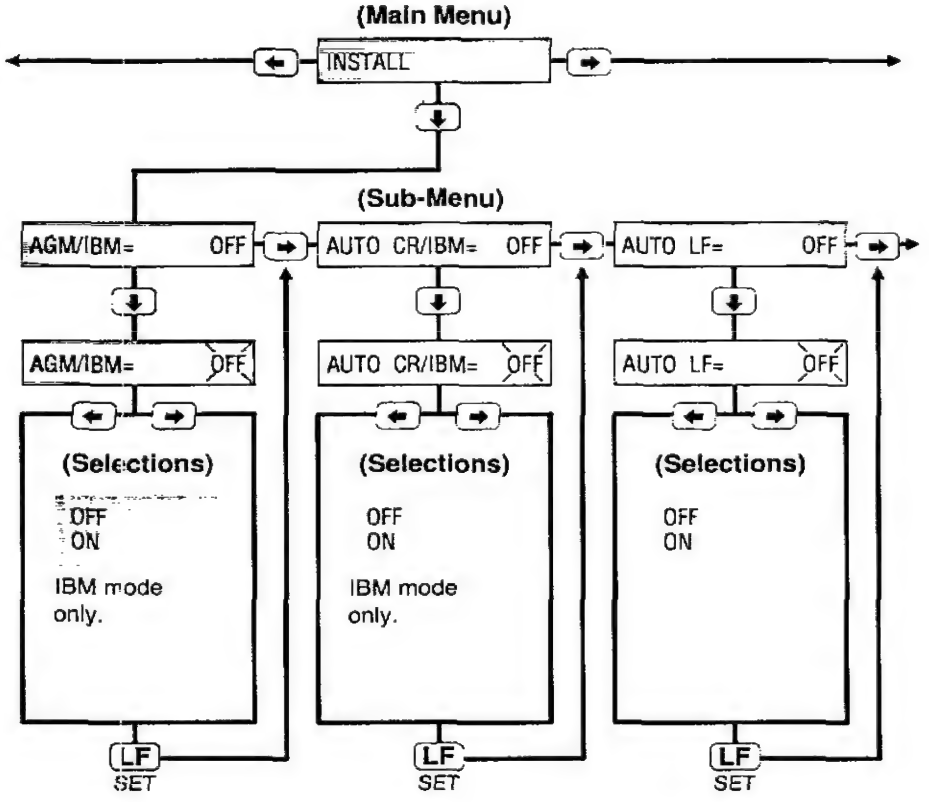
This Sub-menu will allow you to print in 7 different colors. Set your favorite color in the following selections or. by selecting the appropriate driver, color may be accessed through the application software.
(☞ P. 3-38)

Selections	Color	Selections	Color
BLACK	Black	RED	Red
BLUE	Blue	VIOLET	Violet
GREEN	Green	YELLOW	Yellow
ORANGE	Orange		

Note:

- Some application software may not support color.

- Press **FUNCTION** to enter/exit.

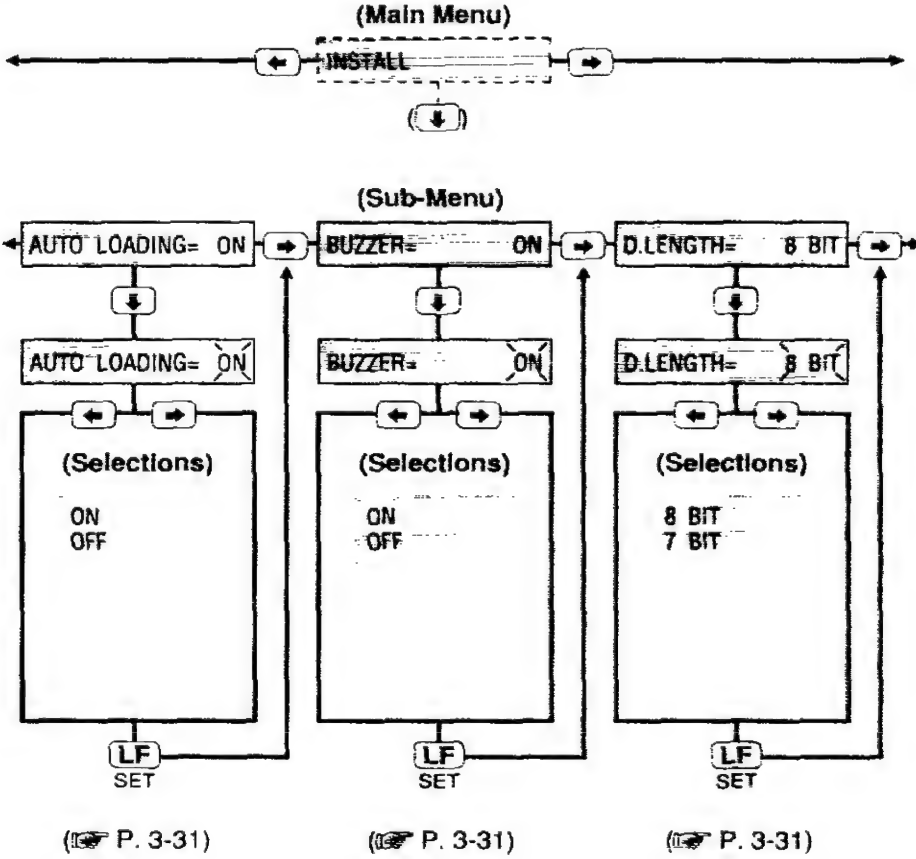


(☞ P. 3-30) (☞ P. 3-30) (☞ P. 3-30)

Note:

- ↑ returns you to the previous menu level.
- Factory settings are indicated in the Sub-menus.
- "xxx" designates blinking message.

- Press [FUNCTION] to enter/exit.

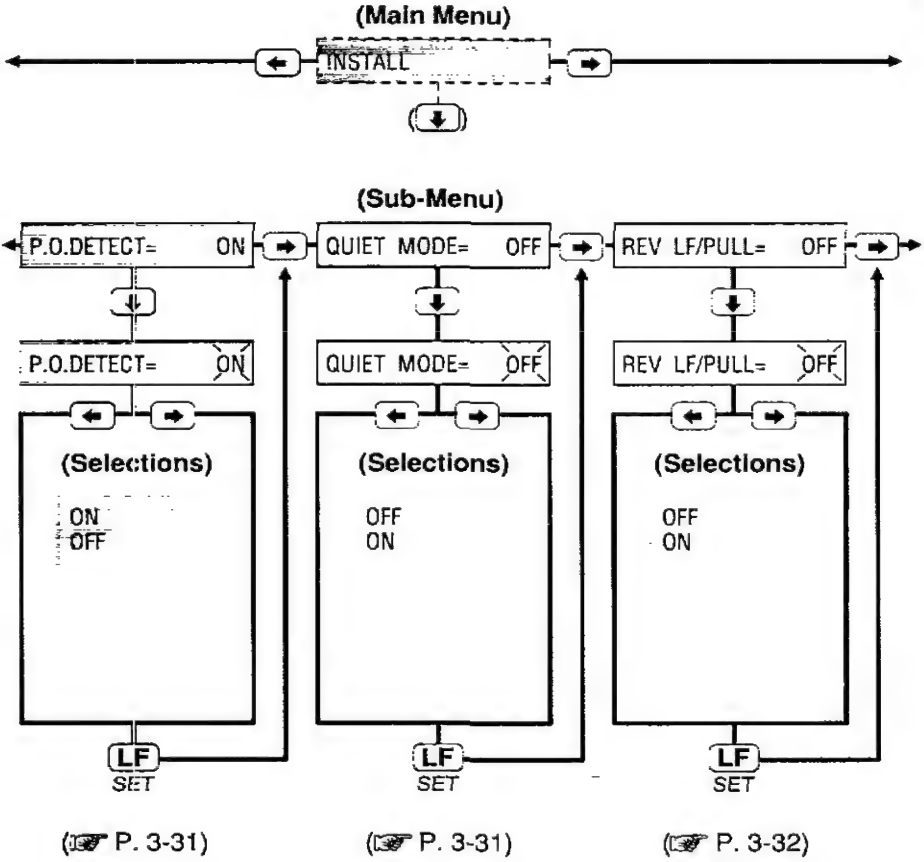


(☞ P. 3-31) (☞ P. 3-31) (☞ P. 3-31)

Note:

- [↑] returns you to the previous menu level.
- Factory settings are indicated in the Sub-menus.
-)xxx(designates blinking message.

- Press **FUNCTION** to enter/exit.

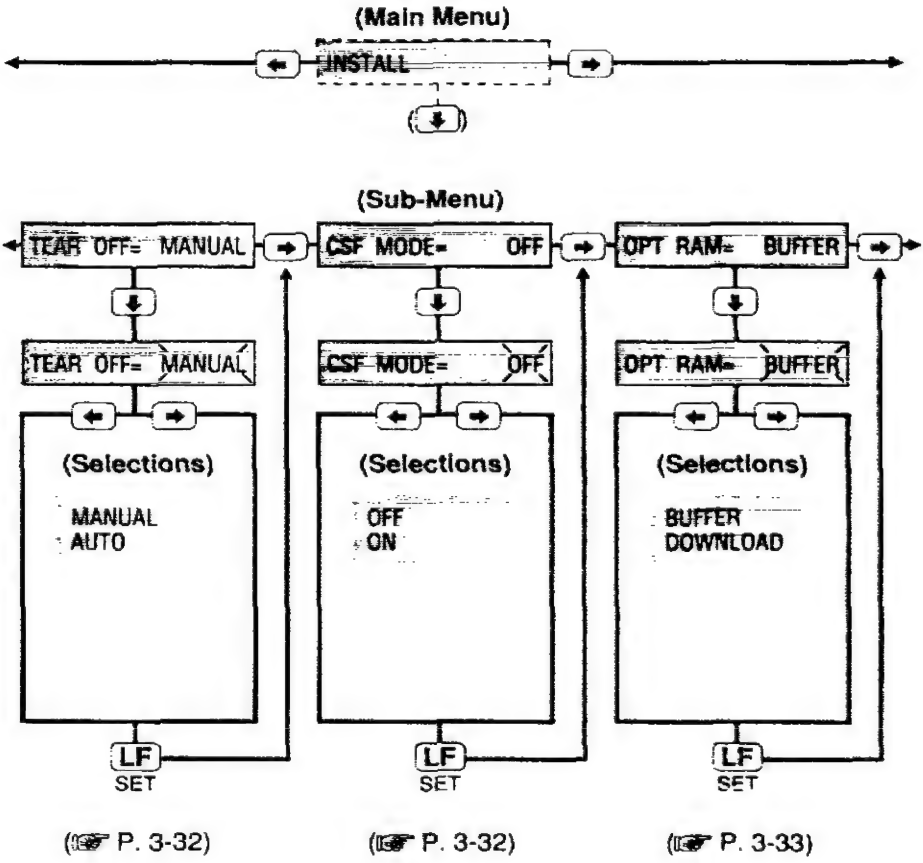


(☞ P. 3-31) (☞ P. 3-31) (☞ P. 3-32)

Note:

- ↕ returns you to the previous menu level.
- Factory settings are indicated in the Sub-menus.
- "xxx" designates blinking message.

- Press FUNCTION to enter/exit.

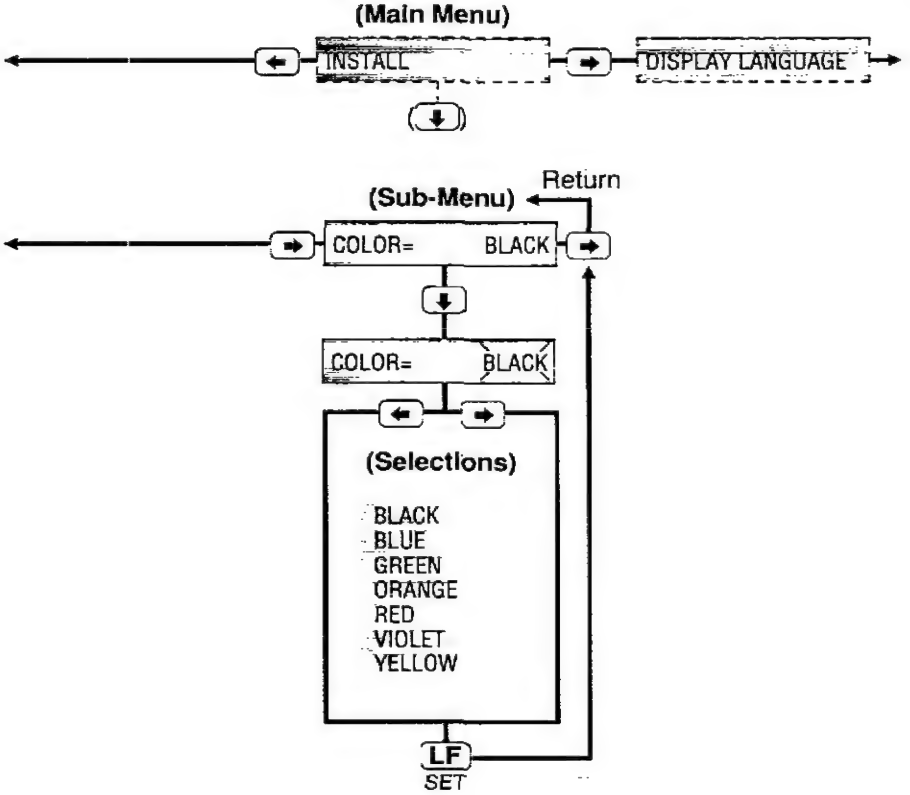


(☞ P. 3-32) (☞ P. 3-32) (☞ P. 3-33)

Note:

- ↑ returns you to the previous menu level.
- Factory settings are indicated in the Sub-menus.
- xxx designates blinking message.

- Press **FUNCTION** to enter/exit.



(☞ P. 3-33)

Note:
- ↑ returns you to the previous menu level.
- Factory settings are indicated in the Sub-menus.
- xxx designates blinking message.

DISPLAY LANGUAGE Menu

(To Select the Display Language)

Select and set one of the five display languages in the **LANGUAGE** Selection. (☞ P. 3-40)

MACRO MODE Menu

(To Utilize the MACROs)

A **MACRO** allows you to store a combination of your most frequently used print conditions (all settings in the Function mode) into the printer's memory which can be easily recalled and/or changed. This will enable you to recall one of 4 combinations (MACROs #1, #2, #3, #4) at the touch of a button eliminating the need to reset all your features each time you have a print job that uses a previously set combination.

SAVE MACRO (☞ P. 3-40)

The **SAVE MACRO** is a Sub-menu in the **MACRO MODE** Main menu. This mode will allow you to save your current customized printing requirements to any **SAVE MACRO** (#1, #2, #3 or #4) selection and then **SET** with the [LF] switch. To load your customized macro select the same number in the **LOAD MACRO** Sub-menu.

LOAD MACRO (☞ P. 3-40)

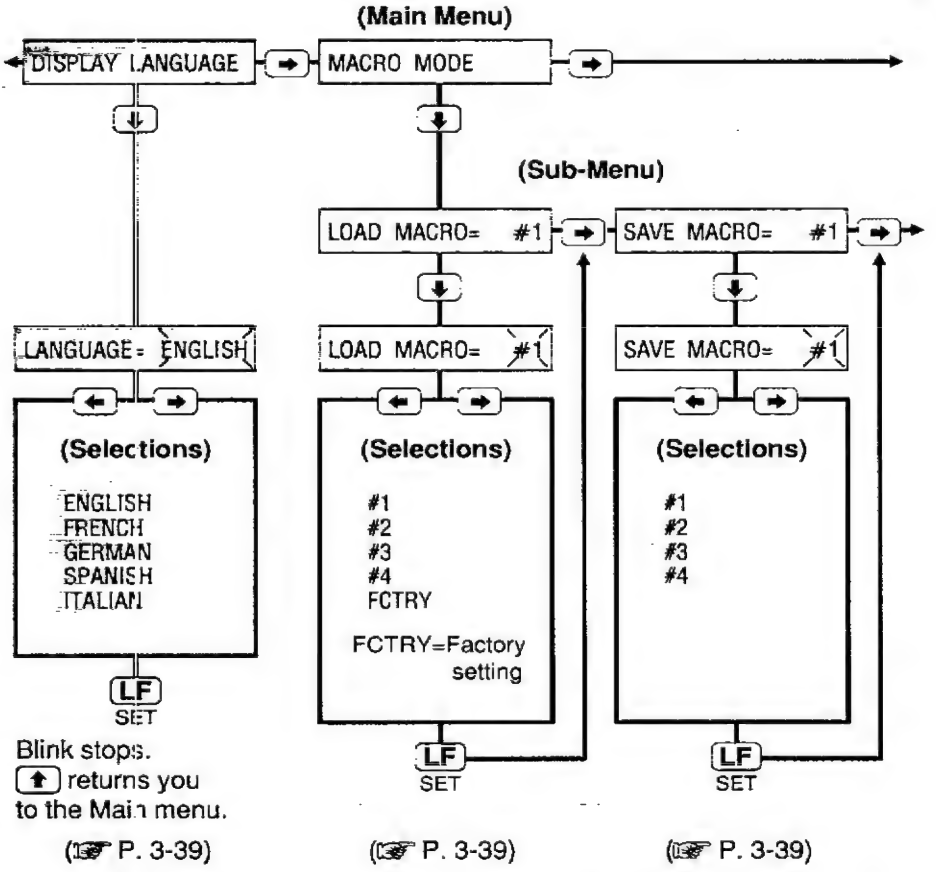
The **LOAD MACRO** is a Sub-menu in the **MACRO MODE** Main menu. This mode will allow you to recall your current customized printing requirements from any **LOAD MACRO** (#1, #2, #3 or #4) selection and then **SET** with the [LF] switch.

POWER ON MACRO (☞ P. 3-41)

The **POWER ON MACRO** is Sub-menu in the **MACRO MODE** Main menu. This mode will allow you to automatically recall a desired **MACRO** or **FACTORY** setting each time you turn on the printer.

FACTORY setting (Default setting): It is for recalling all the settings in the Function mode as they were originally set when the printer was shipped. However, it **does not** change any of the settings which are stored in MACRO #1, 2, 3 or 4. To do so, after recalling the Factory setting, you must save each Macro one at a time.

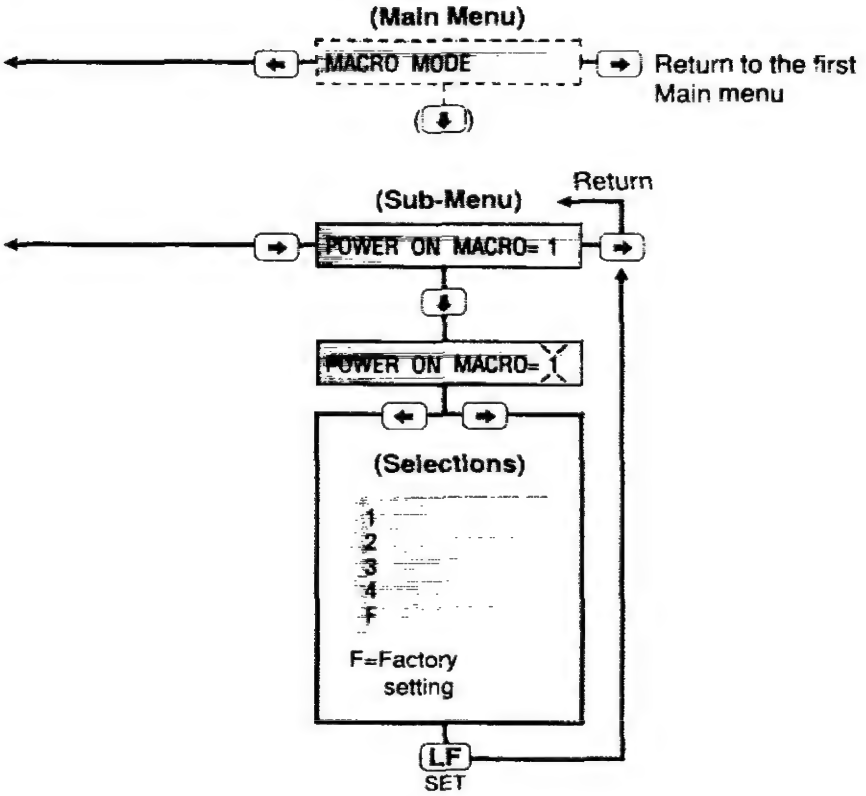
- Press **FUNCTION** to enter/exit.



Note:

- ↑ returns you to the previous menu level.
- Factory settings are indicated in the Sub-menus.
- "XXX" designates blinking message.

- Press [FUNCTION] to enter/exit.



(☞ P. 3-39)

Note:

- [↑] returns you to the previous menu level.
- Factory settings are indicated in the Sub-menus.
- XXX designates blinking message.

Detectors

Paper Out detector

The Paper Out detector is located under the platen and senses the absence of paper. When an out of paper condition occurs, the printing stops, the printer goes to the OFF LINE mode, the alarm sounds and the Paper Out light starts blinking. You will also find that the display shows "PAPER OUT". To continue printing to the end of the current page when an out of paper condition occurs, press the ON LINE switch repeatedly until the page is completed. In this case, the paper will not feed correctly and printout result may not be correct. To start printing the next page, install new paper and press the ON LINE switch. The printer will resume printing.

Note:
The Paper Out detector can be disabled through the Function mode.

Overheat detector

If the printer is printing continuously for extended periods of time, the printhead may become overheated. When this occurs, an internal protective circuit will cause the printer to pause and the display will show "PRINTHEAD HOT" until the head temperature decreases sufficiently, at which time the printer will automatically resume printing without loss of data. This feature is included to extend the life of the printhead.

Overload detector

An overload condition can occur when the path of the printhead is blocked. At that time the carriage will stop moving and the display will show "OVERLOAD".
To resume printing after an overload condition, eliminate the cause of the overload and recycle the power.

Initialization

The printer is initialized under the following conditions:
—the AC power is turned on
—the $\overline{\text{PRIME}}$ signal is received
—the RESET PRINTER command is received
—the clear buffer function is used

When the printer is initialized, the following conditions are set:
—the print buffer is cleared
—the receive buffer is cleared (not cleared by RESET PRINTER command)
—the download character buffer is cleared (not cleared by $\overline{\text{PRIME}}$ signal in IBM Proprinter X24E mode or by RESET PRINTER command)
—horizontal tabs are set every 8 columns
—vertical tab settings are cleared
—all modes set by control and escape commands will be cleared
—present form position is designated as top of form
—the Self Test mode is cleared
—the Function mode settings are read and set
—Control Panel settings are not changed by $\overline{\text{PRIME}}$ signal or RESET PRINTER command*
—the printhead goes to the home position
* Some software packages send $\overline{\text{PRIME}}$ signal at the beginning of their programs. Print modes set by the Function mode will not change.

Clear Buffer Function

This function initializes the printer from the front panel. This feature is very useful when you want to clear the receive buffer (information recently sent from the computer and is currently printing) without changing the front panel settings.

1. Press the **ON LINE** switch to stop the printing and enter the OFF LINE mode.

2. Press the **LF** switch **while** pressing the **FUNCTION** switch to clear the data in the receive buffer.

3. Press the **ON LINE** switch to enter the ON LINE mode.

Hex Dump

In this mode, all data received from the computer is printed in hex code instead of the normal ASCII characters. Function codes for the printer (CR, LF, HT, etc.) are not executed. This mode is very useful to debug programs.

To enter the Hex Dump mode:

Turn the power on while pressing both FF and LF switches.
The display shows "HEX DUMP MODE".

To release the Hex Dump mode:

Turn the power off, then back on.

4. Software Introduction

Emulation

This printer is compatible with Epson LQ-860 and IBM Proprinter X24E.

Introduction

In order for a computer to communicate with a printer, both pieces of equipment must understand a common language or coding scheme. One such coding scheme is called ASCII (American Standard Code for Information Interchange). For example, the ASCII code can express the character "K" in any of the following forms:

$(01001011)_2$—Binary
$4B_{HEX}$, $4B_H$—Hexadecimal
75_{DEC}, 75_D—Decimal

Many computers allow you to enter ASCII codes in either hexadecimal or decimal form. The entered ASCII codes are converted to binary form by the computer and then sent to the printer.

In the following sections, you will see how to enter various ASCII codes to enable the printer to perform the functions you would like. Since the decimal equivalent of the ASCII code is most commonly used, all examples that follow will use the decimal form.

Appendix A contains the ASCII characters and control command tables used by this printer.

Control Codes

The various printer functions are set through the use of control codes, which consist of one or more ASCII characters entered into the computer in a special way. These control codes often differ from printer to printer. Control codes generally fall into two categories: one-byte control codes and multi-byte control codes. The multi-byte control codes are often referred to as Escape Sequences since each code begins with the ASCII code for the ESCAPE character (ESC). Such an ESC character should not be confused with the Escape Key found on some computer keyboards.

Control codes can be sent to this printer from your computer in different ways. The three most common ways are:

- Through commercial software packages
- Directly from the keyboard
- From within a user written program

The latter two methods will specifically refer to the BASIC language, although other languages such as FORTRAN and PASCAL, can also be used. We will use BASIC since it is a relatively easy language to use. In addition, it is one of the most commonly used microcomputer languages.

Entering Control Codes Directly from the Keyboard

With many computers, the BASIC language is ready to use once you power up. With others, BASIC must be loaded into memory. In any case, once BASIC is ready, you may then enter these printer control commands directly from your computer keyboard.

BASIC requires the use of the PRINT command (or LPRINT, PRINT#, etc. depending on the type of BASIC your computer uses) to process and send the control commands to this printer. As part of this print command, you must supply the appropriate ASCII code(s) for the character string (CHR$) function.

For example, the command: **LPRINT CHR$(15)** (decimal code 15) followed by a **RETURN** will set this printer to compressed mode. Subsequent output to this printer will appear in compressed mode.

If, after issuing the above command, subsequent PRINT statements output nothing to the printer, check for one or more of the following:

- Have you indicated to the computer that output is to the printer and not to the screen? For example, PR#1, causes subsequent PRINT statements on the Apple computer to PRINT to the printer and not to the screen. LPRINT does the same in Microsoft BASIC.

- Is this printer on line? If not, press the green ON LINE switch on the front panel.

- Is the interface cable plugged into the computer and printer?

- When using a serial interface, is the baud rate setting on the printer the same as that on the computer or interface card?

Notice that when you enter a BASIC command directly from the keyboard, you do NOT use a line number as you would in a BASIC program. Moreover, control codes may be entered only one line at a time.

Entering Control Codes from Within a Basic Program

Control codes may also be entered from within a BASIC program. The advantage to this technique is that you can incorporate a number of different control commands into a single program and therefore produce output with a variety of special features. This is done by RUNning your program once. In this case BASIC requires that each line in your program be preceded by a line number.

As an example, we mentioned earlier that the command **LPRINT CHR$(15)** entered directly from the keyboard will set compressed print on the printer. From within a BASIC program, this command might be:

```
50 LPRINT CHR$(15)
```

Entering Hexadecimal Code

In the event that you will be entering ASCII codes in hexadecimal form, you must supply two extra characters per code. These are the ampersand (&) and the letter H. The example below illustrates the BASIC command to set compressed print on this printer.

Decimal	Hexadecimal
LPRINT CHR$(15)	LPRINT CHR$(&H0F)

•☞ Appendix A

Entering Single-Byte and Multi-Byte Control Codes

A number of the printer control commands require only a single ASCII-coded character as part of the LPRINT statement. The command LPRINT CHR$(15), which we discussed earlier, is an example of a single-byte control command.

Multi-byte control codes, often called Escape control codes or Escape sequences, always begin with an ESC designation. ESC is designated by CHR$(27) in decimal form or CHR$(&H1B) in hexadecimal form. The ESC designation is always followed by one or more additional codes, hence the name multi-byte control code.

In BASIC, these two or more bytes are joined (or concatenated) into a single command or string using either a plus (+) sign, a semicolon(;), or by neither symbol but rather by listing one byte after another without any spaces. Refer to your BASIC manual for the proper method of string concatenation.

Table 4.1 and 4.2 on the following page, show equivalent methods of entering multi-byte control commands for most computers.

There is one remaining input format commonly used to reduce the keystrokes necessary to enter a multi-byte control command. As you examine the multi-byte control commands in the pages ahead, you will notice that the second byte, with the exception of ESC+SO and ESC+SI, is always a character that appears somewhere on your keyboard. In such cases, rather than enter that character's ASCII code as part of the CHR$ function, you may simply enter that character in quotes ("). For example, to set pica pitch (ESC+"P"), you may enter:

LPRINT CHR$(27)+"P"; or LPRINT CHR$(27)+CHR$(80);

As another example, to set double width printing, you may enter:

LPRINT CHR$(27)+"W"+CHR$(1);
or
LPRINT CHR$(27)+CHR$(87)+CHR$(1);

With this method, any of the three input formats shown in Table 4.1 and 4.2 may also be used (subject to the BASIC you are using).

	Two-Byte Command
Function	Set Pica Pitch
Name	ESC+"P"
Code	27, 80DEC
Input Format 1	LPRINT CHR$(27)+"P";
Input Format 2	LPRINT CHR$(27);"P";
Input Format 3	LPRINT CHR$(27)"P";

Table 4.1 Two-Byte Command Input Format

	Three-Byte Command
Function	Set Double Wide Printing
Name	ESC+"W"+1
Code	27, 87, 1DEC
Input Format 1	LPRINT CHR$(27)+"W"+CHR$(1);
Input Format 2	LPRINT CHR$(27);"W";CHR$(1);
Input Format 3	LPRINT CHR$(27)"W"CHR$(1);

Table 4.2 Three-Byte Command Input Format

This printer has two printer (emulation) modes. They are Epson LQ-860 and IBM Proprinter X24E. Software commands for each mode are covered in the corresponding chapters.

Special Code for IBM PC or Compatible Computers

Since the LPRINT command on the IBM PC or compatible computer can generate an unexpected Line Feed (LF) and/or Carriage Return (CR), use PRINT #1 instead of LPRINT. For details refer to your BASIC manual. The following two lines of BASIC are necessary at the top of the program.

```
10 WIDTH "LPT1:", 255
20 OPEN "LPT1:" AS #1
```

The following line of BASIC is necessary at the end of the program:

```
100 CLOSE
```

(line # will vary according to your program)

PRINT #1 does not generate CR and LF; therefore, a CR and LF must be used when they are required.

5. Features

Print Feature Controls

Print Quality and Font

This printer has three print quality levels: Draft, LQ (Letter Quality) and SLQ (Super Letter Quality). Draft is printed at the fastest speed and is normally used for printing draft documents. LQ produces the high print quality and SLQ produces much better print quality than LQ; they are used to print the final version of formal documents.

(Print Example)

```
Draft:
    ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789
    abcdefghijklmnopqrstuvwxyz
Roman:
    ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789
    abcdefghijklmnopqrstuvwxyz
Sans Serif:
    ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789
    abcdefghijklmnopqrstuvwxyz
Courier:
    ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789
    abcdefghijklmnopqrstuvwxyz
Prestige:
    ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789
    abcdefghijklmnopqrstuvwxyz
Script:
    ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789
    abcdefghijklmnopqrstuvwxyz
OCR-B:
    ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789
    abcdefghijklmnopqrstuvwxyz
Bold PS:
    ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789
    abcdefghijklmnopqrstuvwxyz
ORATOR:
    ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789
    ABCDEFGHIJKLMNOPQRSTUVWXYZ
Super Letter Quality (Roman):
    ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789
    abcdefghijklmnopqrstuvwxyz
```

Character Pitch

The height of the characters in the different pitches is the same; only the width varies. The pitches are fixed pitch (within a pitch, all characters have the same width).

In proportional spacing, character widths vary with the character. An "I", for example, takes up less space than an "M" or a "W". Proportional printing gives the document a typeset appearance.

The following table shows pitch availability for each font.

Font	5	6	7.5	8.5	10	12	15	17	20	PS
Draft	○	○	○	○	○	○	○	○	○	
Roman	○	○	○	○	○	○	○	○	○	○
Sans Serif	○	○	○	○	○	○	○	○	○	○
Courier	○	○	○	○	○	○	○	○	○	○
Prestige	○	○	○	○	○	○	○	○	○	○
Script	○	○	○	○	○	○	○	○	○	○
OCR-B	○	○	●	○	○	○	●	○	○	○
Bold PS	○	○	○	○	○	○	○	○	○	○
Orator	○	○	○	○	○	○	○	○	○	○
SLQ (Roman)	○	○			○	○				

●OCR-B micron prints using the Sans Serif font.

(Print Example)

```
5 cpi printing
  (Pica elongated)
6 cpi printing
  (Elite elongated)
7.5 cpi printing
  (Micron elongated)
8.5 cpi printing
  (Compressed elongated)
10 cpi printing (Pica)
12 cpi printing (Elite)
15 cpi printing (Micron)
17 cpi printing (Compressed)
20 cpi printing (Elite Compressed)
Proportional Spacing
```

Character Highlighting

This printer allows a document to have a variety of print styles through the Function mode or the software commands.

Double high printing makes the height of a character twice that of a normal one.

Double wide printing makes the width of a character twice that of a normal one.

Double strike printing uses a double strike with two passes of the printhead.

Bold (Emphasized) printing is done with one pass of the printhead at half speed, which allows horizontally adjacent dots to be printed.

Outline printing makes the outline character of a normal one.

Shadow printing makes the shadow character of a normal one.

Underline printing produces a continuous line under characters, using the 24th pin of the printhead.

Overline printing produces a continuous line over characters using the first pin of the printhead.

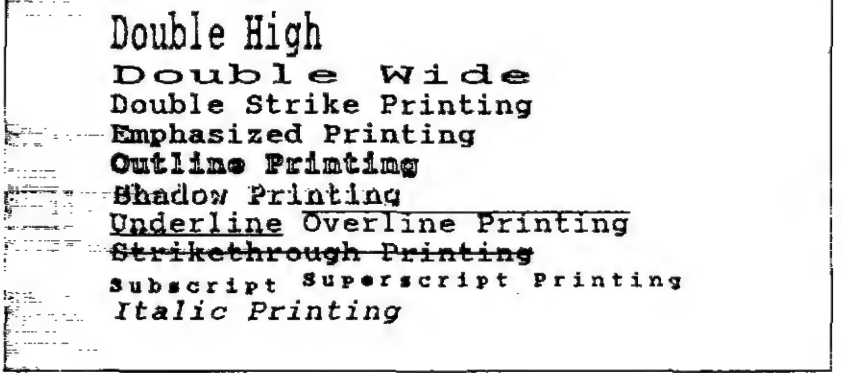
Strikethrough printing produces a continuous line in the middle of characters using the 12th and 13th pins of the printhead.

Subscript printing makes the height of a character one-half that of a normal one and a character is printed on a bottom-half of a line.

Superscript printing makes the height of a character one-half that of a normal one and a character is printed on a top-half of a line.

Italic printing makes a character slope from the right downwards.

(Print Example)



Download Characters

Should you need to custom design special characters in addition to those provided, the 32K byte buffer option (KX-P43), is required. Draft and Letter Quality (LQ) fonts can be downloaded simultaneously. Draft download characters are printed when the printer is in draft mode. LQ characters are printed when the printer is in LQ mode.

To Download a character, you must first make preparations for:
—Installing the 32K buffer option (KX-P43).
—OPT RAM in the INSTALL menu is set to DOWNLOAD through the Function mode (☞ P. 3-33, 3-37).

Making Maximum Use of the Buffer

Epson LQ-860 mode

18K (18,432) bytes are available and can be divided between draft and LQ characters in any combination, subject to hexadecimal address and buffer limits. Draft letters require 39 bytes maximum and LQ letters require 114 maximum. To determine if the desired combination will fit, use the formula:

(# of draft characters×39)+(# of LQ characters×114)≦18,432

For example: 120 draft and 120 LQ are desired.

(120×39)+(120×114)=4,680+13,680=18,360

Therefore this combination will fit.

Because no more than 256 addresses can be identified in 1 byte (00_{HEX}–FF_{HEX}), 256 is the maximum number of draft characters that can be defined. The maximum number of LQ characters that can be loaded is 161.

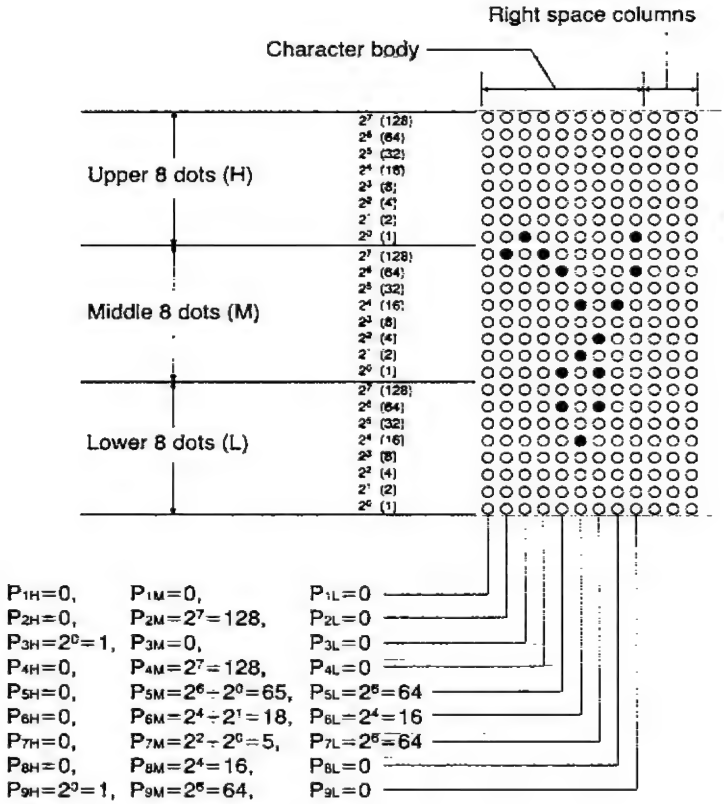
IBM Proprinter X24E mode

The 32K bytes available can be divided between draft and LQ characters in any combination. The download data also can be entered to RAM by compression. The maximum number of characters depends on the manner in which the characters are entered.

Designing Download Characters

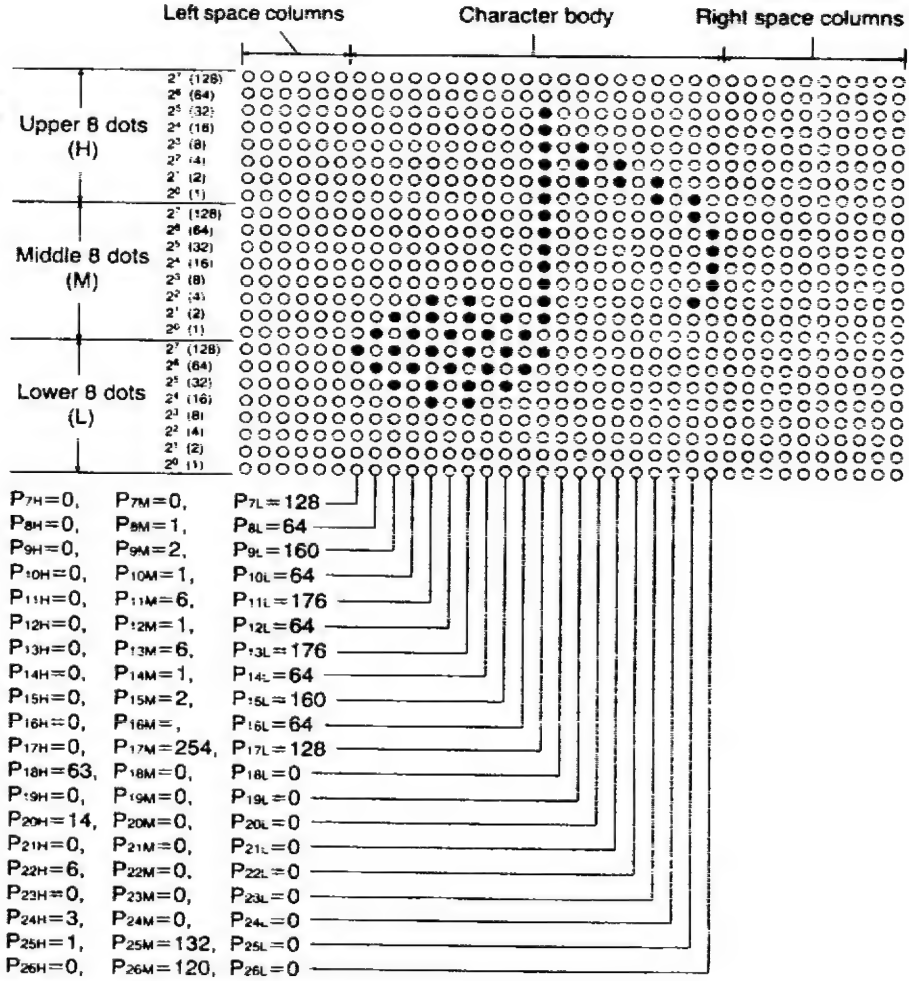
1. Draft Font

To download a character you must first design the character. A draft font download character uses 9 columns and 24 rows of dots. Since a given column contains 24 dots, each column is divided into 3 portions, upper 8, middle 8 and lower 8 dots. Column 1 is labeled P_{1H} for the upper 8 dots, P_{1M} for the middle 8 and P_{1L} for the lower 8 dots. Similarly column 9 is labeled P_{9H} for the upper 8 dots, P_{9M} for the middle 8 and P_{9L} for the lower 8 dots. Columns 10, 11 and 12 are always set to zero, thus we are working with P_{1H} through P_{9L}. In the matrix on the next page, the circles represent pins that may be fired. You may darken any circle, provided no two adjacent horizontal circles are filled in. Once you have designed the character, you must quantify each dot column, P_{1H}–P_{9H}, by summing the powers of two represented by each dot. Consider the design of the Greek character gamma.


Right space columns
Character body
Upper 8 dots (H)
Middle 8 dots (M)
Lower 8 dots (L)
2^7 (128)
2^6 (64)
2^5 (32)
2^4 (16)
2^3 (8)
2^2 (4)
2^1 (2)
2^0 (1)
$P_{1H}=0$, $P_{1M}=0$, $P_{1L}=0$
$P_{2H}=0$, $P_{2M}=2^7=128$, $P_{2L}=0$
$P_{3H}=2^0=1$, $P_{3M}=0$, $P_{3L}=0$
$P_{4H}=0$, $P_{4M}=2^7=128$, $P_{4L}=0$
$P_{5H}=0$, $P_{5M}=2^6+2^0=65$, $P_{5L}=2^6=64$
$P_{6H}=0$, $P_{6M}=2^4+2^1=18$, $P_{6L}=2^4=16$
$P_{7H}=0$, $P_{7M}=2^2+2^0=5$, $P_{7L}=2^6=64$
$P_{8H}=0$, $P_{8M}=2^4=16$, $P_{8L}=0$
$P_{9H}=2^0=1$, $P_{9M}=2^6=64$, $P_{9L}=0$

2. LQ Font

A LQ font download character uses 36 columns and 24 rows of dots. Designing and storing fonts can be performed in the same way as with draft fonts. Here, consider the design of the one-eighth-note character:



Entering Download Data

Epson LQ-860 mode

1. Draft Font

Download command in the Epson LQ-860 mode is:
ESC+"&"+0+n+m+d_0+d_1+d_2+DATA

Input format for a download command is:
LPRINT CHR$(27)+"&"+CHR$(0)+CHR$(n)+CHR$(m)+CHR$($d_0$)
+CHR$($d_1$)+CHR$(d_2)+DATA
Programming example for the Greek character gamma is as follows (column 1 is programmed as left space column):

```
10 REM Draft Download Character
20 WIDTH "LPT1:",255
30 OPEN "LPT1:" AS #1
40 PRINT #1,CHR$(27)+"x0";
50 PRINT #1,CHR$(27)+":"+CHR$(0)+CHR$(0)+CHR$(0);
60 PRINT #1,CHR$(27)+"&"+CHR$(0)+CHR$(65)+CHR$(65);
70 PRINT #1,CHR$(1)+CHR$(8)+CHR$(3);
80 PRINT #1,CHR$(0)+CHR$(128)+CHR$(0);
90 PRINT #1,CHR$(1)+CHR$(0)+CHR$(0);
100 PRINT #1,CHR$(0)+CHR$(128)+CHR$(0);
110 PRINT #1,CHR$(0)+CHR$(65)+CHR$(64);
120 PRINT #1,CHR$(0)+CHR$(18)+CHR$(16);
130 PRINT #1,CHR$(0)+CHR$(5)+CHR$(64);
140 PRINT #1,CHR$(0)+CHR$(16)+CHR$(0);
150 PRINT #1,CHR$(1)+CHR$(64)+CHR$(0);
160 REM Download character print
170 PRINT #1,CHR$(27)+"%"+CHR$(1);
180 PRINT #1,"A A A A A A A A A A ";CHR$(10);
190 PRINT #1,CHR$(27)+"%"+CHR$(0);
200 END
```

First determine where in RAM the character(s) should be stored. The variables "n" and "m" are used for this purpose. The value specified for n indicates the location into which the first download character will be stored. The value specified for "m" indicates the location into which the last download character will be stored. If you are storing a single character, then n=m.

Next define the value of "d_0", "d_1" and "d_2" which specify attribute information. The attribute information includes the following:

d_0=number of space dot columns to the left of the character body
d_1=number of character body dot columns
d_2=number of space dot columns to the right of the character body

In our sample program, we created a gamma character. This character consists of 1 left space dot column, 8 body dot columns and 3 right space dot columns. Therefore, $d_0=1$, $d_1=8$ and $d_2=3$.
In general, d_1 cannot exceed 9 and $d_0+d_1+d_2$ cannot exceed 12.

Note:

- Program line 40 is necessary for downloading the draft font and designates draft printing.
- Program lines 80~150 use the eight values P_{2H}~P_{9L} to define the shape and size of the gamma.
- Program line 170 selects download character generator. After this selection, by printing the download code [in this example, CHR$(65)="A"] the downloaded character is printed.
- Two horizontal adjacent columns cannot be printed in either draft or LQ mode.

2. LQ Font

Input format is the same as with draft fonts.

Programming example for the one-eighth-note character is as follows:

```
10 REM Define Download Letter  Quality Character
20 WIDTH "LPT1:",255
30 OPEN "LPT1:" AS #1
40 PRINT #1,CHR$(27)+"x1";
50 PRINT #1,CHR$(27)+":"+CHR$(0)+CHR$(0)+CHR$(0);
60 PRINT #1,CHR$(27)+"&"+CHR$(0)+CHR$(65)+CHR$(65);
70 PRINT #1,CHR$(6)+CHR$(20)+CHR$(10);
80 PRINT #1,CHR$(0)+CHR$(0)+CHR$(128);
90 PRINT #1,CHR$(0)+CHR$(1)+CHR$(64);
100 PRINT #1,CHR$(0)+CHR$(2)+CHR$(160);
110 PRINT #1,CHR$(0)+CHR$(1)+CHR$(64);
120 PRINT #1,CHR$(0)+CHR$(6)+CHR$(176);
130 PRINT #1,CHR$(0)+CHR$(1)+CHR$(64);
140 PRINT #1,CHR$(0)+CHR$(6)+CHR$(176);
150 PRINT #1,CHR$(0)+CHR$(1)+CHR$(64);
160 PRINT #1,CHR$(0)+CHR$(2)+CHR$(160);
170 PRINT #1,CHR$(0)+CHR$(1)+CHR$(64);
180 PRINT #1,CHR$(63)+CHR$(254)+CHR$(128);
190 PRINT #1,CHR$(0)+CHR$(0)+CHR$(0);
200 PRINT #1,CHR$(14)+CHR$(0)+CHR$(0);
210 PRINT #1,CHR$(0)+CHR$(0)+CHR$(0);
220 PRINT #1,CHR$(6)+CHR$(0)+CHR$(0);
230 PRINT #1,CHR$(0)+CHR$(0)+CHR$(0);
240 PRINT #1,CHR$(3)+CHR$(0)+CHR$(0);
250 PRINT #1,CHR$(0)+CHR$(0)+CHR$(0);
260 PRINT #1,CHR$(1)+CHR$(132)+CHR$(0);
270 PRINT #1,CHR$(0)+CHR$(120)+CHR$(0);
280 REM Download character print
290 PRINT #1,CHR$(27)+"%"+CHR$(1);
300 PRINT #1,"A A A A A A A A A A A ";CHR$(10);
310 PRINT #1,CHR$(27)+"%"+CHR$(0);
320 END
```

The number of printable columns for characters downloaded in the letter quality font is as follows:

	$d_0+d_1+d_2$
LQ 10 cpi	36
LQ 12 cpi	30
Proportional Spacing	42

Print Mode Combination:

- Draft Download characters can be printed only when the FONT is set to Draft through the Function mode or through software commands.
- Letter quality download characters can be printed only when the FONT is set to Bold PS, Courier, Orator, Prestige, Roman, Sans Serif, Script or OCR-B through the Function mode or through software commands.

Super/subscript characters

To download a super/ a subscript character, you have to enter the super/subscript mode before defining the characters (by using the command ESC+"S"+n). In this mode, the received data is then processed as data for super/subscript. Since the super/subscript character is only 2/3 the height of normal character (16 dots vs. 24 dots high), it needs only two bytes of data for each column.

The defined character is used either as a superscript or as a subscript character.
The only difference is the location of the printed character. The superscript character is printed in the upper 2/3 position of the normal character cell, while the subscript characters is in the lower 2/3 position of that cell. You can select the one which you want by changing the value of n on the command. (n=0: superscript, n=1: subscript.)
The table below shows the maximum values allowable.

	Height	Width	
		d_1	$d_0+d_1+d_2$
Draft	16	7	12
Letter Quality	16	23	36
PS	16	23	42

Note:
- When you download a Draft or LQ character in this mode, the pitch keeps normal width though the font is reduced to 2/3 width.
- In PS mode, the font and pitch are reduced to 2/3 original width.

IBM Proprinter X24E mode

Downloading fonts in IBM Proprinter X24E mode requires downloading character Dot Pattern data and character Index Table data. Dot pattern data controls which pins fire when printing a character, Index Table data is placed in a "lookup table" that provides information on where Dot Pattern data is stored in memory and defines certain attributes of the character.

The format for the command to input download data is:

$ESC+"="+n_1+n_2+35+A_1+A_2+d_1+d_2+...+d_x$

where

$n_1+(256\times n_2)$=the number of data bytes to be downloaded, 35 is a fixed number that must always be sent, A_1 and A_2 indicate the low order and high order addresses in which data is to be stored, and d_1, d_2. . is the data being downloaded. This data will be in one of two formats, depending on whether it is Dot Pattern or Index Table:

Index Table Addresses

Starting memory addresses for Index Tables are:

Draft (10 and 12 cpi)	8011_{HEX}
LQ 10 cpi	8912_{HEX}
LQ Proportional	9213_{HEX}
LQ 12 cpi	$9B14_{HEX}$

To calculate the address for an individual character Index Table Entry, use the equation:

Address=9×ASCII character number+starting address.

To find the address of the Index Table location for the draft letter "A":

Multiply 9×65 (ASCII character number for "A")=585_{DEC}

Convert to hexadecimal=249_{HEX}

Add starting address for draft=8011_{HEX}

yielding $825A_{HEX}$ making $A_1=5A_{HEX}$, and $A_2=82_{HEX}$.

Dot Pattern Data

Dot Pattern data is sent for all columns that must be uniquely defined. If adjacent horizontal columns are identical (or can be made identical knowing that the printer will not print adjacent horizontal dots) data compression may be used and the duplicate data need not be sent. Dot Pattern data may be stored at any address from $A414_{HEX}$ to $FFFF_{HEX}$ inclusive.

Dot columns for characters are as follows:

Draft (10 and 12 cpi) . . . . . 10 columns
LQ 10 cpi . . . . . 36 columns
LQ 12 cpi . . . . . 30 columns
LQ Proportional . . . . . 18~42 columns

It is important to note that the last column is always blank. (e.g. A download draft character is defined by 9 columns. The printer automatically adds the tenth column.)

$$Data = P_{1H} + P_{1M} + P_{1L} + P_{2H} + P_{2M} + P_{2L} + \ldots + P_{nH} + P_{nM} + P_{nL}$$

Index Table Data

$$AA_1 + AA_2 + IT_1 + IT_2 + CM_1 + \ldots + CM_5$$

where

AA_1 and AA_2 indicate the address where Dot Pattern data is stored. AA_1 and AA_2 are the high order and the low order bytes respectively.

IT_1 is Index Table byte #1. Bit designation is:

Bit	0	1
7	Normal Character	Graphic Character
6	Download Character	Resident Character
5~0	Number of columns in the character memory	

IT_2 is Index Table byte #2. Bit designation is:

Bits 7, 6	Type of block graphic character	
	00	shading character
	01	line drawing character
	10	underscore character
	11	not supported

Bits 5~0 number of columns in the character less 1
[e.g. for draft characters, $10-1=9_{DEC}=(001001)_2$
bits 5~0=001001]

CM_1~CM_5 are compression mask bits. (0=no compression, 1=compression)

CM_1 bit 7=1st dot column
bit 6=2nd dot column
.
.
.

CM_5 bit 3=37th dot column
bit 2=38th dot column
bit 1=39th dot column
bit 0=40th dot column

Note:

- All block graphic characters are 30 dots high, even though only 24 dots are defined for each column. An underline is defined as a blank block graphic character (all zeros). The underline is generated by the printer during the second pass. A shadow character repeats dots 1~6 of each column as dots 25 through 30 respectively. A line draw character repeats dots 23 and 24 as the pairs 25 and 26, 27 and 28, and 29 and 30.
- Entry data can designate any character data image whether resident or downloaded. Multiple table entries can designate the same character. The address of an undefined entry should be 000. An undefined entry is printed as a space.
- Location 0 (00_{HEX}) normally stores the slashed zero. If a character is downloaded into this location, when the slashed zero is selected through the Function mode, the downloaded character will print in place of any zero.

Data Compression

Data Compression allows the efficient use of memory in storing downloaded characters, providing space for more characters than would be available without compression. The printer repeats the previous dot column in the current column when the current column compression mask bit is set to 1.

Resetting Download Area

Issuing the command ESC+"="+0+0 initializes the download area. All previously downloaded characters are cleared and the Index Tables are loaded with information for resident fonts.

Programming Examples:

To load the draft character used in the example for the Epson LQ-860 mode (Greek gamma), the following program may be used.

```
10 REM Greek Gamma Character Download and print
20 WIDTH "LPT1:",255
30 OPEN  "LPT1:" AS  #1
40 REM---(Initialize the Download Buffer)
50 PRINT #1,CHR$(27)+"="+CHR$(0)+CHR$(0);
60 REM---(Dot Pattern Data Entry to ASCII "A")
70 PRINT #1,CHR$(27)+"="+CHR$(30)+CHR$(0)+CHR$(35);
80 PRINT #1,CHR$(&H0)+CHR$(&HB0);
90 PRINT #1, CHR$(0)+CHR$(128)+CHR$(0);
100 PRINT #1,CHR$(1)+CHR$(0)+CHR$(0);
110 PRINT #1,CHR$(0)+CHR$(128)+CHR$(0);
120 PRINT #1,CHR$(0)+CHR$(65)+CHR$(64);
130 PRINT #1,CHR$(0)+CHR$(18)+CHR$(16);
140 PRINT #1,CHR$(0)+CHR$(5)+CHR$(64);
150 PRINT #1,CHR$(0)+CHR$(16)+CHR$(0);
160 PRINT #1,CHR$(1)+CHR$(64)+CHR$(0);
170 PRINT #1,CHR$(0)+CHR$(0)+CHR$(0);
180 REM---(Index Table Entry to ASCII "A" )
190 PRINT #1,CHR$(27)+"="+CHR$(12)+CHR$(0)+CHR$(35);
200 PRINT #1,CHR$(&H5A)+CHR$(&H82);
210 PRINT #1,CHR$(&HB0)+CHR$(&H0)+CHR$(8);
220 PRINT #1,CHR$(10)+CHR$(0)+CHR$(0);
230 PRINT #1,CHR$(0)+CHR$(0)+CHR$(0);
240 REM---(Download Character print )
250 PRINT #1,CHR$(27)+"I"+CHR$(4);
260 FOR I=1 TO 10
270 PRINT #1, "A";
280 NEXT
290 PRINT #1,CHR$(13);CHR$(10);
300 CLOSE #1
310 END
```

In this example of Greek gamma, a character is not compressed, and data of CM_1 through CM_8 are all zeros.

To load the LQ character used in the example for the one-eighth-note character, the following program may be used.

Input format is the same as with draft fonts.

Programming example for the one-eighth-note character is as follows:

```
10 REM One-eight-note Character Download and print
20 WIDTH "LPT1:",255
30 OPEN  "LPT1:" AS  #1
40 REM---(Initialize the Download Buffer)
50 PRINT #1,CHR$(27)+"="+CHR$(0)+CHR$(0);
60 REM---(Dot Pattern Data Entry to ASCII "B")
70 PRINT #1,CHR$(27)+"="+CHR$(45)+CHR$(0)+CHR$(35);
80 PRINT #1,CHR$(&H0)+CHR$(&HB0);
90 PRINT #1, CHR$(0)+CHR$(0)+CHR$(0);
100 PRINT #1,CHR$(0)+CHR$(0)+CHR$(128);
110 PRINT #1,CHR$(0)+CHR$(1)+CHR$(64);
120 PRINT #1,CHR$(0)+CHR$(3)+CHR$(224);
130 PRINT #1,CHR$(0)+CHR$(7)+CHR$(240);
140 PRINT #1,CHR$(0)+CHR$(3)+CHR$(224);
150 PRINT #1,CHR$(0)+CHR$(1)+CHR$(64);
160 PRINT #1,CHR$(63)+CHR$(254)+CHR$(128);
170 PRINT #1,CHR$(14)+CHR$(0)+CHR$(0);
180 PRINT #1,CHR$(6)+CHR$(0)+CHR$(0);
190 PRINT #1,CHR$(3)+CHR$(0)+CHR$(0);
200 PRINT #1,CHR$(1)+CHR$(132)+CHR$(0);
210 PRINT #1,CHR$(0)+CHR$(120)+CHR$(0);
220 PRINT #1,CHR$(0)+CHR$(0)+CHR$(0);
230 REM---(Index Table Entry to ASCII "B" )
240 PRINT #1,CHR$(27)+"="+CHR$(12)+CHR$(0)+CHR$(35);
250 PRINT #1,CHR$(&H64)+CHR$(&H8B);
260 PRINT #1,CHR$(&HB0)+CHR$(&H0)+CHR$(14);
270 PRINT #1,CHR$(35)+CHR$(124)+CHR$(90);
280 PRINT #1,CHR$(85)+CHR$(47)+CHR$(240);
290 REM---(Download Character print )
300 PRINT #1,CHR$(27);"I";CHR$(6);
310 FOR I=1 TO 10
320 PRINT #1,"B";
330 NEXT
340 PRINT #1,CHR$(13);CHR$(10);
350 CLOSE #1
360 END
```

Note:

- The left most column of adjacent identical columns has its compression mask bit set to 0, and that bit in the other columns is set to 1.
- Entry data can designate any character data image whether resident or downloaded. Multiple table entries can designate the same character. The address of an undefined entry should be 000. An undefined entry is printed as a space.
- Location 0 (00_{HEX}) normally stores the slashed zero. If a character is downloaded into this location, when the slashed zero is selected through the Function mode, the downloaded character will print in place of any zero.
- ASCII character in location 255 (FF_{HEX}) cannot be defined.

Bit Image (Graphics)

Bit image (Graphics) is used to produce pictures, graphs, charts or creative patterns. Many commercial software packages use bit images. This printer has six 8-pin bit image modes and five 24-pin bit image modes within LQ-860 mode, and has four 8-pin/24-pin bit image modes within IBM Proprinter X24E mode, so that you have a wide variety of image printing. When you use a commercial software package, you should refer to your software instruction manual for the proper use. Each printer mode has its own bit image commands. Because differences between the two modes are few, only LQ-860 mode is used here as an example of how to print bit images through software commands.

Dot Density

Dot density (dot resolution) refers to the maximum number of dots that can be printed in an inch or on a line. This printer enables you to access a variety of dot densities through specific control commands. The various dot densities and corresponding control commands appear in Table 5.1.

Command	Function	Dots/inch	Dots/line
ESC+"K"+n_1+n_2	Standard density	60	480
ESC+"L"+n_1+n_2	Double density	120	960
ESC+"Y"+n_1+n_2	Double speed, Double density	120	960
ESC+"Z"+n_1+n_2	Quadruple density	240	1920
ESC+"*"+m+n_1+n_2	8-Pin Mode Selection:		
	m=0 (Standard)	60	480
	m=1 (Double)	120	960
	m=2 (Double speed, Double density)	120	960
	m=3 (Quadruple density)	240	1920
	m=4 (CRT I)	80	640
	m=6 (CRT II)	90	720
	24-Pin Mode Selection:		
	m=32 (Standard)	60	480
	m=33 (Double)	120	960
	m=38 (CRT III)	90	720
	m=39 (Triple)	180	1440
	m=40 (Hex)	360	2880
ESC+"["+"g"+n_1 +n_2+m (IBM Proprinter X24E mode only)	8-Pin Mode Selection:		
	m=0 (Standard)	60	480
	m=1 (Double)	120	960
	m=2 (Double speed, Double density)	120	960
	m=3 (Quadruple density)	240	1920
	24-pin Mode Selection:		
	m=8 (Standard)	60	480
	m=9 (Double)	120	960
	m=11 (Triple)	180	1440
	m=12 (Hex)	360	2880

Table 5.1 Dot Density

8-Pin Bit Image Mode

This printer has 24 pins in the printhead. The distance between the centers of adjacent pins is 1/180" (0.14 mm), and the diameter of each pin is 1/127" (0.2 mm). In 8-pin bit image mode the 24 pins of the printhead are grouped as follows. One byte is sent to the printer for each column to be printed. Each bit of that byte represents an individual pin-block. By summing the powers of two corresponding to each pin-block you wish to fire, you will obtain a numerical value for the column in question. By sending a string of bytes, numerical values for each column on a line are input and processed. The result is one line of graphics.

Pin-block	Pin-block Code
1	$2^7=128$
2	$2^6=64$
3	$2^5=32$
4	$2^4=16$
5	$2^3=8$
6	$2^2=4$
7	$2^1=2$
8	$2^0=1$

Pin-block Code	Pin-block
$2^7=128$	1
	1 and 2
$2^6=64$	2
$2^5=32$	3
	3 and 4
$2^4=16$	4
$2^3=8$	5
	5 and 6
$2^2=4$	6
$2^1=2$	7
	7 and 8
$2^0=1$	8

Not used

LQ-860 mode and
IBM Proprinter X24E mode
(Alternate Graphic Mode: ON)

IBM Proprinter X24E mode
(Alternate Graphic Mode: OFF)

Note:

- **In the LQ-860 mode or IBM Proprinter X24E mode with Alternate Graphic Mode (AGM) set to ON through the Function mode, 8-pin bit image graphics is printed by using all 24 pins in the printhead.**

As an example, suppose you want to fire pin-blocks 1, 2, 5 and 8 simultaneously. Then you compute the following sum:

Input code = Pin-block 1 code + Pin-block 2 code +
Pin-block 5 code + Pin-block 8 code
$= 2^7 + 2^6 + 2^3 + 2^0 = 128 + 64 + 8 + 1 = 201$

Thus, the value 201 is entered in the CHR$ function in order to print a single column of dots resulting from firing pin-blocks 1, 2, 5 and 8.

For our final example, refer to the standard density designation in Table 5.1. This setting is given by ESC+"K"+n_1+n_2. To print image graphics, you must specify to the printer how many columns are to be used. This is done by finding values for n_1 and n_2, as follows:
Divide the total number of columns you select, by 256 (max # of columns). The result is n_1 and the remainder is n_2.

$$\begin{array}{r} 0\ (n_2) \\ 256\ \overline{)\ 100} \\ \underline{0} \\ 100\ (n_1) \end{array}$$

so, $n_2 = 0$ and $n_1 = 100$

Our control code ESC+"K"+n_1+n_2 now translates into:

```
LPRINT CHR$(27)+"K"+CHR$(100)+CHR$(0);
```

If you use ESC+"["+"g"+n_1+n_2+m in IBM Proprinter X24E mode, compute the values of n_1 and n_2 as follows:

$n_2 \times 256 + n_1 = \text{Column} \times \text{Bytes} + 1$

m=0, 1, 2, 3: Bytes=1
m=8, 9, 11, 12: Bytes=3

For example, 24-pin bit image of 100 column is:
$100 \times 3 + 1$, so $n_2 = 1$ and $n_1 = 45$.

For example, you select 100 columns and double density (or m=9, page 7-14), so your bytes are equal to 3. Now, use the following equation:
100 columns×3 bytes+1=301 (always add 1).

Using the equation from above, we have:

$$256 \overline{)\,301}\ (n_2)$$
$$\underline{256}$$
$$45\ (n_1)$$

A programming example is as follows:

```
10 REM STANDARD DENSITY
20 WIDTH "LPT1:",255
30 OPEN "LPT1:" AS #1
40 PRINT #1,CHR$(27)+"3"+CHR$(24);
50 PRINT #1,CHR$(27)+"K"+CHR$(100)+CHR$(0);
60 FOR I=1 TO 5
70 PRINT #1,CHR$(1)+CHR$(2)+CHR$(4)+CHR$(8)+CHR$(16);
80 PRINT #1,CHR$(32)+CHR$(64)+CHR$(128)+CHR$(64)+CHR$(128);
90 PRINT #1,CHR$(64)+CHR$(128)+CHR$(64)+CHR$(128)+CHR$(64);
100 PRINT #1,CHR$(32)+CHR$(16)+CHR$(8)+CHR$(4)+CHR$(2);
110 NEXT I
120 PRINT #1,CHR$(13)+CHR$(10);
130 PRINT #1,CHR$(27)+"K"+CHR$(100)+CHR$(0);
140 FOR I=1 TO 5
150 PRINT #1,CHR$(128)+CHR$(64)+CHR$(32)+CHR$(16)+CHR$(8);
160 PRINT #1,CHR$(4)+CHR$(2)+CHR$(1)+CHR$(2)+CHR$(1);
170 PRINT #1,CHR$(2)+CHR$(1)+CHR$(2)+CHR$(1)+CHR$(2);
180 PRINT #1,CHR$(4)+CHR$(8)+CHR$(16)+CHR$(32)+CHR$(64);
190 NEXT I
200 PRINT #1,CHR$(13);CHR$(10);
210 CLOSE
220 END
```

24/180" Line space set

2nd line data

1st line data

Note:
Line 20 and 30 are necessary for the proper execution of this program on many IBM-compatible computers.
Line 40 is necessary to set the line feed for printing in the bit image mode. In the IBM Proprinter X24E mode, when AGM is set to OFF through the Function mode, it will amount to 24/216 inch.

24-Pin Bit Image Mode

In the 24-pin bit image mode, all 24-pins of the printhead may be fired. In this mode, 3 data bytes must be sent to the printer for each column. The 24 pins in the printhead are divided into three portions, the upper 8 pins, middle 8 pins and lower 8 pins.
As an example, suppose you want to fire pins 1, 2, 5, 8, 9, 11, 12, 21 and 24 simultaneously. Then you compute the following three values:

Byte 1: Input code=Pin 1 code+Pin 2 code+Pin 5 code+Pin 8 code
$=2^7+2^6+2^3+2^0=128+64+8+1=201$
Byte 2: Input code=Pin 9 code+Pin 11 code+Pin 12 code
$=2^7+2^5+2^4=128+32+16=176$
Byte 3: Input code=Pin 21 code+Pin 24 code=$2^3+2^0=8+1=9$

Thus, the three bytes for a single column of dots are entered as CHR$(201);CHR$(176);CHR$(9); Refer to the 24-pin standard density command in Table 5.1. This setting is given by ESC+"*"+m+n_1+n_2, where m=32. Suppose you wish to print 100 columns of dots, where every column fires pins 1, 2, 5, 8, 9, 11, 12, 21 and 24 as above.

As in the 8-pin example on page 5-19, n_1=100 and n_2=0. Our command ESC+"*"+m+n_1+n_2 now translates into
LPRINT CHR$(27)+"*"+CHR$(32)+CHR$(100)+CHR$(0);
If we incorporate this information into a program, we might have the following:

```
10 REM 24 PIN STANDARD DENSITY
20 WIDTH "LPT1:" ,255
30 OPEN "LPT1:" AS #1
40 PRINT #1,CHR$(27)+"*"+CHR$(32)+CHR$(100)+CHR$(0);
50 FOR I=1 TO 100
60 PRINT #1,CHR$(201);
70 PRINT #1,CHR$(176);
80 PRINT #1,CHR$(9);
90 NEXT I
100 PRINT #1,CHR$(10);
110 CLOSE
120 END
```

Note:

- If in IBM mode AGM must be set to ON. (☞ P. 3-34)
- If you use ESC+"["+"g"+n_1+n_2+m in IBM Proprinter X24E mode, you must change line 40 as follows:
  40 PRINT #1, CHR$(27)+"["+"g"+CHR$(45)+CHR$(1)+CHR$(8);

Note:
- Bit Image Graphics prints unidirectionally for high precision printing. For high speed printing set the printer to bidirectional printing through the Function mode (☞ P. 3-20, 3-22).
- Graphics mode is released immediately following the printing of all bit image data. Printing will return to text mode.
- Bit Image data is not affected by MSB control commands.

Alternate Graphic Mode (AGM)

There are two methods of graphic printing in IBM Proprinter X24E mode. You can set them through Alternate Graphic Mode setting through the Function mode or software.

When AGM is set to OFF, 8-pin bit image graphic is printed by using pins 1 through 20.

When AGM is set to ON, the printing of 8-pin graphic mode is the same as in Epson LQ-860 mode. Also, graphic printing command, ESC+"*" in Epson LQ-860 mode is effective in this mode. Therefore, you can use the same command as in Epson LQ-860 mode.

The following table shows commands affected by AGM mode.

		AGM ON	AGM OFF
ESC+"K"+n_1+n_2 ESC+"L"+n_1+n_2 ESC+"Y"+n_1+n_2 ESC+"Z"+n_1+n_2		use 24 pin	use 20 pin
ESC+"["+ "g"+n_1+n_2+m (IBM Proprinter X24E mode only)	8-pin mode	use 24 pin	use 20 pin
	24-pin mode		use 24 pin
ESC+"3"+n		based on n/180 inch	based on n/216 inch
ESC+"A"+n		based on n/60 inch	based on n/72 inch
ESC+"J"+n		based on n/180 inch	based on n/216 inch

6. Epson LQ-860 Mode Commands

This chapter covers the software commands when selecting the Epson LQ-860 mode. The software commands are grouped into the following classifications:

FONT SELECTION

Name	Function	Page
ESC+"x"+n	Selects print quality	6-6
ESC+"k"+n	Selects print typeface	6-6
ESC+"S"+1	Selects subscript printing	6-7
ESC+"S"+0	Selects superscript printing	6-7
ESC+"T"	Releases sub/superscript printing	6-7

6

CHARACTER PITCH SELECTION

Name	Function	Page
ESC+"P"	Sets pica pitch (10 cpi) printing	6-7
ESC+"M"	*Sets elite pitch (12 cpi) printing	6-8
ESC+"g"	Sets micron (15 cpi) printing	6-8
SI	*Sets compressed (17 cpi) printing	6-9
ESC+SI	*Sets compressed (17 cpi) printing	6-9
DC2	Releases compressed printing	6-9
ESC+"p"+1	Sets proportional spacing	6-9
ESC+"p"+0	Releases proportional spacing	6-9
ESC+"l"+n	Sets certain pitches based upon value of n	6-10

* When elite and compressed pitch are set simultaneously, subsequent output is printed in 20 cpi (up to 160 cpi).

CHARACTER HIGHLIGHT SELECTION

Name	Function	Page
ESC+"l"+n	Sets highlighting based upon value of n	6-10
ESC+"E"	Sets emphasized printing	6-10
ESC+"F"	Releases emphasized printing	6-10
ESC+"w"+1	Sets double high printing	6-11
ESC+"w"+0	Releases double high printing	6-11
SO	Sets single-line double wide printing	6-11
ESC+SO	Sets single-line double wide printing	6-11
DC4	Releases single-line double wide printing	6-11
ESC+"W"+1	Sets double wide printing	6-12
ESC+"W"+0	Releases double wide printing	6-12
ESC+"q"+n	Sets outline and shadow printing	6-12

CHARACTER HIGHLIGHT SELECTION (continued)

Name	Function	Page
ESC+"G"	Sets double strike printing	6-13
ESC+"H"	Releases double strike printing	6-13
ESC+"-"+1	Sets underlining	6-13
ESC+"-"+0	Releases underlining	6-13
ESC+"("+"-" +3+0+1 +d_1+d_2	Sets/releases score	6-14

WORD PROCESSING MODE SELECTION

Name	Function	Page
ESC+"a"+0	Selects left alignment mode	6-14
ESC+"a"+1	Selects centering mode	6-14
ESC+"a"+2	Selects right alignment mode	6-14
ESC+"a"+3	Selects justification mode	6-14
ESC+SP+n	Sets character dots spacing	6-15

CHARACTER SET SELECTION

Name	Function	Page
ESC+"4"	Sets Italic printing	6-15
ESC+"5"	Releases Italic printing	6-15
ESC+"R"+n	Sets international character set	6-16
ESC+"7"	Selects graphic character set 1	6-16
ESC+"6"	Selects graphic character set 2	6-17
ESC+"t"+n	Selects character set	6-17

BIT IMAGE (GRAPHICS) MODE SELECTION

Name	Function	Page
ESC+"K"+n_1 +n_2	Sets 8-pin image standard density (60 dpi)	6-17
ESC+"L"+n_1 +n_2	Sets 8-pin image double density (120 dpi)	6-18
ESC+"Y"+n_1 +n_2	Sets 8-pin image double density/ double speed (120 dpi)	6-18
ESC+"Z"+n_1 +n_2	Sets 8-pin bit image quadruple density (240 dpi)	6-18

BIT IMAGE (GRAPHICS) MODE SELECTION (continued)

Name	Function	Page
ESC+"*"+m +n_1+n_2	Sets bit image mode selection (8-pin 60, 120, 120D, 240, 80, 90, 24-pin 60, 120, 90, 180, 360)	6-19
ESC+"?"+n+m	Reassigns graphics mode density	6-20

PAPER FEED SELECTION—Amount

Name	Function	Page
ESC+"0"	Sets paper feed to 1/8 inch (3.2 mm)	6-20
ESC+"2"	Sets paper feed to 1/6 inch (4.2 mm)	6-21
ESC+"A"+n	Sets paper feed to n/60 inch	6-21
ESC+"3"+n	Sets paper feed to n/180 inch	6-21
ESC+"+"+n	Sets paper feed to n/360 inch	6-22

PAPER FEED SELECTION

Name	Function	Page
LF	Feeds paper one line	6-22
FF	Feeds paper to next top of form	6-23
ESC+"J"+n	Executes paper feed of n/180 inch for one line	6-23
ESC+"j"+n	Executes reverse paper feed of n/180 inch for one line	6-23

PAGE FORMAT CONTROL

Name	Function	Page
ESC+"C"+0+n	Sets page length in inches	6-24
ESC+"C"+n	Sets page length in lines	6-24
ESC+"l"+n	Sets left margin	6-25
ESC+"Q"+n	Sets right margin	6-26
ESC+"N"+n	Sets skip perforation	6-26
ESC+"O"	Releases skip perforation	6-26

TABULATION—Horizontal

Name	Function	Page
ESC+"D"+n_1 +...+n_x+0	Sets horizontal tab	6-27
ESC+"D"+0	Releases horizontal tab	6-27
HT	Executes horizontal tab	6-27

TABULATION—Vertical

Name	Function	Page
ESC+"B"+n_1 +...+n_x+0	Sets vertical tab	6-28
ESC+"B"+0	Releases vertical tab	6-28
VT	*Executes vertical tab*	6-28
ESC+"/"+n	Sets VFU channel	6-29
ESC+"b"+m +n_1+...+n_x+0	Sets VFU tabulation	6-29
ESC+"b"+m+0	Releases VFU tabulation	6-29

CARRIAGE CONTROL

Name	Function	Page
BS	Prints, then backspaces one character	6-30
CR	*Prints a line, then returns carriage*	6-30
ESC+"<"	Sets one line unidirectional printing	6-30
ESC+"U"+1	Sets unidirectional printing	6-31
ESC+"U"+0	Releases unidirectional printing	6-31
ESC+"s"+1	Sets half speed printing	6-31
ESC+"s"+0	Releases half speed printing	6-31
ESC+"$"+$n_1$ +n_2	Moves the print position to an absolute horizontal position	6-31
ESC+"\"+n_1 +n_2	Moves the print position to a relative horizontal position	6-32

Epson LQ-860 Mode Commands

DATA CONTROL

Name	Function	Page
CAN	Clears data in line buffer	6-32
DC1	Selects printer remotely	6-33
DC3	Deselects printer remotely	6-33
DEL	Deletes last printable character	6-33
ESC+">"	Sets MSB on	6-34
ESC+"="	Sets MSB off	6-34
ESC+"#"	Cancels MSB setting	6-34

DOWNLOAD CHARACTER SELECTION

Name	Function	Page
ESC+"&"+0 +n+m+d_0 +d_1+d_2	Defines download font	6-35
ESC+"%"+0	Selects ROM CG	6-35
ESC+"%"+1	Selects download CG	6-35
ESC+":"+0+n +0	Copies internal ROM CG font into download CG	6-36

MISCELLANEOUS

Name	Function	Page
BEL	Sounds the buzzer	6-36
ESC+"@"	Initializes the printer	6-36
ESC+EM+n	Cut Sheet Feeder control	6-37

COLOR SELECTION

Name	Function	Page
ESC+"r"+n	Selects print color	6-37

PRINT QUALITY:

Selects print quality.

Name:	ESC	"x"	n
Dec.:	27	120	n
Hex.:	1B	78	n

Comments:

- The following values of n can be used:
  - r=0: Draft mode
  - r=1: LQ mode
  - r=2: SLQ mode (Roman font)
- PANEL LOCK in the Function mode affects this command.
  (☞ P. 3-21, 3-23)

TYPEFACE:

Selects LQ typeface.

Name:	ESC	"k"	n
Dec.:	27	107	n
Hex.:	1B	6B	n

Comments:

- The following values of n can be used:
  - n=0: Roman
  - n=1: Sans Serif
  - n=2: Courier
  - n=3: Prestige
  - n=4: Script
  - n=5: OCR-B
  - n=6: Bold PS
  - n=7: Orator
- This command is effective only in letter quality mode (ESC+"x"+1).
- PANEL LOCK in the Function mode affects this command.
  (☞ P. 3-21, 3-23)

SUB/SUPERSCRIPT FONT:

Selects sub/superscript font with characters printed in the lower/upper area of the line.

Name:	Set:	ESC	"S"	n	Release:	ESC	"T"
Dec.:		27	83	n		27	84
Hex.:		1B	53	n		1B	54

Comments:

- The following values of n can be used:
  - n=0: Superscript
  - n=1: Subscript
- Sub/superscript font is 2/3 normal character height.
- In draft mode, font is normal character width.
- In LQ mode, font is 2/3 normal fixed character width.
- In PS mode, font is 2/3 normal PS character width. (☞ Appendix B)

PICA PITCH:

Sets printing to 10 characters per inch.

Name:	ESC	"P"
Dec.:	27	80
Hex.:	1B	50

Comments:

- When pica and compressed are set simultaneously output is 17 cpi.
- PANEL LOCK in the Function mode affects this command. (☞ P. 3-21, 3-23)

ELITE PITCH:

Sets printing to 12 characters per inch.

Name:	ESC	"M"
Dec.:	27	77
Hex.:	1B	4D

Comments:

- When elite and compressed are set simultaneously, output is 20 cpi.
- PANEL LOCK in the Function mode affects this command.
(☞ P. 3-21, 3-23)

MICRON PITCH:

Sets printing to 15 characters per inch.

Name:	ESC	"g"
Dec.:	27	103
Hex.:	1B	67

Comments:

- When micron and compressed are set simultaneously, output is 15 cpi.
- PANEL LOCK in the Function mode affects this command.
(☞ P. 3-21, 3-23)

COMPRESSED PITCH:

Sets printing to 17/20 characters per inch.

Name:	Set:	SI	or	ESC	SI	Release:	DC2
Dec.:		15	or	27	15		18
Hex.:		0F	or	1B	0F		12

Comments:

- When pica and compressed are set simultaneously, output is 17 cpi.
- When elite and compressed are set simultaneously, output is 20 cpi.
- When micron and compressed are set simultaneously, output is 15 cpi.
- When PS (Proportional Spacing) and compressed are set simultaneously, font is compressed PS character width. (☞ Appendix B)
- PANEL LOCK in the Function mode affects this command. (☞ P. 3-21, 3-23)

PROPORTIONAL SPACING:

Sets proportional spacing between characters.

Name:	Set:	ESC	"p"	1	Release:	ESC	"p"	0
Dec.:		27	112	1		27	112	0
Hex.:		1B	70	01		1B	70	00

Comments:

- Proportional spacing overrides pica, elite and micron pitch setting.
- When PS (Proportional Spacing) and compressed are set simultaneously, font is compressed PS character width. (☞ Appendix B)
- This command is effective only in letter quality mode (ESC+"x"+1).
- PANEL LOCK in the Function mode affects this command. (☞ P. 3-21, 3-23)

PROGRAMMABLE PITCH/HIGHLIGHTING:

Sets a combination of character pitch and/or highlighting.

Name:	ESC	"!"	n	$(0 \leqq n \leqq 255)_{DEC}$
Dec.:	27	33	n	
Hex.:	1B	21	n	

Comments:

- The value of n determines the pitch and highlight combinations. To find the value of n, add up the decimal numbers below for the print modes you wish to select:
  - 0: Pica
  - 1: Elite
  - 2: PS
  - 4: Compressed
  - 8: Emphasized
  - 16: Double-strike
  - 32: Double-wide
  - 64: Italic
  - 128: Underlining
- Combination print modes follow rules noted in individual commands.
- PANEL LOCK in the Function mode affects this command.
(☞ P. 3-21, 3-23)

EMPHASIZED PRINTING:

Sets printing to twice the original horizontal dot density.

Name:	Set:	ESC	"E"	Release:	ESC	"F"
Dec.:		27	69		27	70
Hex.:		1B	45		1B	46

Comments:

- Emphasized characters are printed at half speed.
- PANEL LOCK in the Function mode affects this command.
(☞ P. 3-21, 3-23)

DOUBLE HIGH PRINTING:

Sets double high printing.

Name:	Set:	ESC	"w"	1	Release:	ESC	"w"	0
Dec.:		27	119	1		27	119	0
Hex.:		1B	77	01		1B	77	00

Comments:

- In the pull tractor mode, this command will not reverse feed paper correctly and the resulting printout may not be correct.
- PANEL LOCK in the Function mode affects this command.
(☞ P. 3-21, 3-23)

DOUBLE WIDE PRINTING—SINGLE LINE:

Sets double wide (expanded) printing for one line only.

Name:	Set:	SO	or	ESC	SO	Release:	DC4	or	ESC	"W"	0
Dec.:		14	or	27	14		20	or	27	87	0
Hex.:		0E	or	1B	0E		14	or	1B	57	00

Comments:

- Single line double wide printing is released when:
  - —a LF, FF or VT is executed.
  - —the printer is initialized.
  - —DC4 or ESC+"W"+0 is executed.
  - —ESC+"!"+0 is executed.
- PANEL LOCK in the Function mode affects this command.
(☞ P. 3-21, 3-23)

DOUBLE WIDE PRINTING:

Sets double wide (expanded) printing.

Name:	Set:	ESC	"W"	1	Release:	ESC	"W"	0
Dec.:		27	87	1		27	87	0
Hex.:		1B	57	01		1B	57	00

Comments:

- DC4 will not release the double wide printing set by ESC+"W"+1.
- Expanded pica output is 5 cpi.
  Expanded elite output is 6 cpi.
  Expanded micron output is 7.5 cpi.
  Expanded compressed output is 8.5 cpi.
- PANEL LOCK in the Function mode affects this command.
  (☞ P. 3-21, 3-23)

OUTLINE/SHADOW PRINTING:

Sets outline and shadow printing.

Name:	ESC	"q"	n
Dec.:	27	113	n
Hex.:	1B	71	n

Comments:

- The following values of n can be used:
  n=0: Releases outline/shadow printing
  n=1: Outline
  n=2: Shadow
  n=3: Outline with Shadow
- PANEL LOCK in the Function mode affects this command.
  (☞ P. 3-21, 3-23)

DOUBLE STRIKE PRINTING:

Sets double printing.

Name:	Set:	ESC	"G"		Release:	ESC	"H"	
Dec.:		27	71			27	72	
Hex.:		1B	47			1B	48	

Comments:

- Double strike printing prints each line twice, with the second line slightly below the first to create a bold appearance.
- PANEL LOCK in the Function mode affects this command. (☞ P. 3-21, 3-23)

UNDERLINING:

Sets continuous underlining of characters.

Name:	Set:	ESC	"-"	1	Release:	ESC	"-"	0	
Dec.:		27	45	1		27	45	0	
Hex.:		1B	2D	01		1B	2D	00	

Comment:

- Bit image data, spaces set by the HT code, and IBM graphic characters will not be underlined.

SCORE:

Sets/releases score.

Name:	ESC	"("	"-"	3	0	1	d_1	d_2
Dec.:	27	40	45	3	0	1	d_1	d_2
Hex.:	1B	28	2D	03	00	01	d_1	d_2

Comments:

- The value of d_1 determines the location of the score:
  - c_1=1: Underline
  - c_1=2: Strikethrough
  - c_1=3: Overscore
- The value of d_2 determines whether the score line is single, double, broken or continuous:
  - c_2=0: Cancel the score line selected by d_1
  - c_2=1: Single continuous line
  - c_2=2: Double continuous line
  - c_2=5: Single broken line
  - c_2=6: Double broken line

JUSTIFICATION MODE SELECTION:

Selects alignment of characters across print line.

Name:	ESC	"a"	n
Dec.:	27	97	n
Hex.:	1B	61	n

Comment:

- The following values of n can be used:
  - n=0: Selects left alignment mode.
  - n=1: Selects centering mode.
  - n=2: Selects right alignment mode.
  - n=3: Selects full justification mode.

CHARACTER DOT SPACING:

Sets character dot spacing until changed.

Name:	ESC	SP	n	(0≦n≦127)DEC
Dec.:	27	32	n	
Hex.:	1B	20	n	

Comments:

- Sets the amount of dot space (Draft: 1/120 inch, LQ: 1/180 inch) added to the right of each character to allow microjustification.

ITALIC FONT:

Selects italic character printing.

Name: Set:	ESC	"4"	Release:	ESC	"5"
Dec.:	27	52		27	53
Hex.:	1B	34		1B	35

Comments:

- Italic characters are printed in place of characters at character set locations 32DEC~126DEC (20HEX~7EHEX).
- This command is effective regardless of character set selected by ESC+"t"+n.
- PANEL LOCK in the Function mode affects this command. (☞ P. 3-21, 3-23)

INTERNATIONAL CHARACTER SET:

Selects international character set.

Name:	ESC	"R"	n
Dec.:	27	82	n
Hex.:	1B	52	n

Comments:

- The following values of n can be used:
  - n=0~13: Selects one of 14 language character sets
  - n=64: Selects legal character set.
- Refer to table on page A-17.
- PANEL LOCK in the Function mode affects this command. (☞ P. 3-21, 3-23)

GRAPHIC CHARACTER SET I:

Selects graphic character set 1.

Name:	ESC	"7"
Dec.:	27	55
Hex.:	1B	37

Comments:

- Refer to table in Appendix A
- This command is operational only when the graphic character set is selected by ESC+"t"+1.
- PANEL LOCK in the Function mode affects this command. (☞ P. 3-21, 3-23)

GRAPHIC CHARACTER SET II:

Selects graphic character set 2.

Name:	ESC	"6"	
Dec.:	27	54	
Hex.:	1B	36	

Comments:

- Refer to table in Appendix A.
- This command is operational only when the graphic character set is selected by ESC+"t"+1.
- PANEL LOCK in the Function mode affects this command.
  (☞ P. 3-21, 3-23)

CHARACTER SET SELECTION:

Selects character set.

Name:	ESC	"t"	n
Dec.:	27	116	n
Hex.:	1B	74	n

Comments:

- The following values of n can be used:
  n=0: Italic character set
  n=1: Graphic character set
  n=2: Remaps any downloaded characters from 0-127$_{DEC}$ to 128-255$_{DEC}$.
  Refer to table in Appendix A.
- PANEL LOCK in the Function mode affects this command.
  (☞ P. 3-21, 3-23)

8-PIN STANDARD DENSITY GRAPHICS:

Sets standard density graphics mode [60 dots per inch (25.4 mm)].
(☞ P. 5-18—5-22)

Name:	ESC	"K"	n_1	n_2	Data
Dec.:	27	75	n_1	n_2	Data
Hex.:	1B	4B	n_1	n_2	Data

8-PIN DOUBLE DENSITY GRAPHICS:

Sets double density graphics mode [120 dots per inch (25.4 mm)]. (☞ P. 5-18—5-22)

Name:	ESC	"L"	n_1	n_2	Data
Dec.:	27	76	n_1	n_2	Data
Hex.:	1B	4C	n_1	n_2	Data

8-PIN DOUBLE SPEED/DOUBLE DENSITY GRAPHICS:

Sets double speed, double density graphics mode [120 dots per inch (25.4 mm)]. (☞ P. 5-18—5-22)

Name:	ESC	"Y"	n_1	n_2	Data
Dec.:	27	89	n_1	n_2	Data
Hex.:	1B	59	n_1	n_2	Data

Comment:

- Horizontal adjacent dots cannot be printed.

8-PIN QUADRUPLE DENSITY GRAPHICS:

Sets quadruple density graphics mode [240 dots per inch (25.4 mm)]. (☞ P. 5-18—5-22)

Name:	ESC	"Z"	n_1	n_2	Data
Dec.:	27	90	n_1	n_2	Data
Hex.:	1B	5A	n_1	n_2	Data

Comment:

- Horizontal adjacent dots cannot be printed.

BIT IMAGE MODE SELECTION:

Selects one of the 8-pin or 24-pin bit image graphic modes.
(☞ P. 5-18—5-24)

Name:	ESC	"*"	m	n_1	n_2	Data
Dec.:	27	42	m	n_1	n_2	Data
Hex.:	1B	2A	m	n_1	n_2	Data

Comments:

- The following table illustrates the various modes based upon the values of m.

m	pin	Dots/Inch	
0	8	60	Standard Density
1	8	120	Double Density
2	8	120	Double Speed, Double Density
3	8	240	Quadruple Density
4	8	80	CRT I
6	8	90	CRT II
32	24	60	Standard Density
33	24	120	Double Density
38	24	90	CRT III
39	24	180	Triple Density
40	24	360	Hex Density

- When m=2, 3, 40, horizontal adjacent dots cannot be printed.
- The values n_1 and n_2 indicate the number of graphic columns to be printed. (☞ P. 5-18—5-24)

BIT IMAGE MODE REASSIGNMENT:

Reassigns bit image graphics mode density.

Name:	ESC	"?"	n	m
Dec.:	27	63	n	m
Hex.:	1B	3F	n	m

Comments:

- The value of n specifies the graphics mode which is to be reassigned:
  - r=75: Reassign Standard Density (ESC+"K"+n_1+n_2)
  - r=76: Reassign Double Density (ESC+"L"+n_1+n_2)
  - r=89: Reassign Double Speed, Double Density (ESC+"Y"+n_1+n_2)
  - r=90: Reassign Quadruple Density (ESC+"Z"+n_1+n_2)
- The value of m specifies the graphics mode to which the original is to be reassigned. (☞ P. 6-19)

6

1/8 INCH PAPER FEED:

Sets paper feed amount to 1/8 inch (3.2 mm).

Name:	ESC	"0"
Dec.:	27	48
Hex.:	1B	30

Comment:

- PANEL LOCK in the Function mode affects this command. (☞ P. 3-21, 3-23)

1/6 INCH PAPER FEED:

Sets paper feed amount to 1/6 inch (4.23 mm).

Name:	ESC	"2"	
Dec.:	27	50	
Hex.:	1B	32	

Comment:

- PANEL LOCK in the Function mode affects this command.
  (☞ P. 3-21, 3-23)

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n/60 INCH PAPER FEED:

Sets paper feed amount to n/60 inch.

Name:	ESC	"A"	n	$(0 \leqq n \leqq 127)_{DEC}$
Dec.:	27	65	n	
Hex.:	1B	41	n	

Comment:

- PANEL LOCK in the Function mode affects this command.
  (☞ P. 3-21, 3-23)

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n/180 INCH PAPER FEED:

Sets paper feed amount to n/180 inch.

Name:	ESC	"3"	n	$(0 \leqq n \leqq 255)_{DEC}$
Dec.:	27	51	n	
Hex.:	1B	33	n	

Comment:

- PANEL LOCK in the Function mode affects this command.
  (☞ P. 3-21, 3-23)

n/360 INCH PAPER FEED:

Sets paper feed amount to n/360 inch.

Name:	ESC	"+"	n	$(0 \leqq n \leqq 255)_{DEC}$
Dec.:	27	43	n	
Hex.:	1B	2B	n	

Comment:

- PANEL LOCK in the Function mode affects this command. (☞ P. 3-21, 3-23)

LINE FEED (LF):

Feeds paper to next line position after printing data in the line buffer.

Name:	LF
Dec.:	10
Hex.:	0A

Comments:

- The amount of spacing generated by LF is determined by the paper feed commands or the EZ Set Operator Panel.
- When the new line position falls within the perforation skip area, the paper advances to the next top of form position.

FORM FEED (FF):

Feeds paper to next top of form position after printing data in the line buffer.

Name:	FF
Dec.:	12
Hex.:	0C

Comment:

- The amount of spacing generated by FF is determined by the page length commands or the EZ Set Operator Panel.

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n/180 INCH SINGLE LINE FEED:

Feeds paper n/180 inch after printing data in the line buffer.

Name:	ESC	"J"	n	$(0 \leqq n \leqq 255)_{DEC}$
Dec.:	27	74	n	
Hex.:	1B	4A	n	

---

n/180 INCH REVERSE DIRECTION SINGLE LINE:

Prints out the data in the line buffer and feeds the paper n/180 inch in reverse direction.

Name:	ESC	"j"	n	$(0 \leqq n \leqq 255)_{DEC}$
Dec.:	27	106	n	
Hex.:	1B	6A	n	

Note:

- Reverse paper feed cannot be executed in the area within 3.6 inches (91.4 mm) of the bottom perforation. Additionaly, the perforation should not be included in the area of reverse paper feed.
- In the pull tractor mode, this command will not reverse feed paper correctly and the resulting printout may not be correct.

PAGE LENGTH (INCHES):

Sets page length in inches.

Name:	ESC	"C"	0	n	(0≦n≦22)DEC
Dec.:	27	67	0	n	
Hex.:	1B	43	00	n	

Comments:

- Upon receipt of ESC+"C"+0+n, the present line position becomes the top of form position.
- ESC+"C"+0+n releases the skip perforation settings.
- The page length does not change even if the paper feed amount is changed.
- The terms "form" and "page" are interchangeable.
- PANEL LOCK in the Function mode affects this command. (☞ P. 3-21, 3-23)

PAGE LENGTH (LINES):

Sets page length in number of lines.

Name:	ESC	"C"	n	(0≦n≦127)DEC
Dec.:	27	67	n	
Hex.:	1B	43	n	

Comments:

- Upon receipt of ESC+"C"+n, the present line position becomes the top of form position.
- If n=0, page length returns to the inch designation.
- ESC+"C"+n releases the skip perforation settings.
- The page length does not change even if the paper feed amount is changed.
- The terms "form" and "page" are interchangeable.
- PANEL LOCK in the Function mode affects this command. (☞ P. 3-21, 3-23)

LEFT MARGIN:

Sets position of left margin.

Name:	ESC	"*l*"	n
Dec.:	27	108	n
Hex.:	1B	6C	n

Comments:

- The following values of n can be used:

	8" print line	9" print line
Pica print	0≦n≦78	0≦n≦88
Elite print	0≦n≦93	0≦n≦105
Micron print	0≦n≦117	0≦n≦133
Compressed print	0≦n≦133	0≦n≦151

- If the value of n exceeds the right margin value, ESC+"*l*"+n is ignored.
- Setting the left margin clears all data in the line buffer.
- In proportional spacing, the value of n is based on 10 cpi.
- Once the left margin position is set, a change in the character mode will not alter this left margin setting.
- PANEL LOCK in the Function mode affects this command.
(☞ P. 3-21, 3-23)

RIGHT MARGIN:

Sets position of right margin.

Name:	ESC	"Q"	n
Dec.:	27	81	n
Hex.:	1B	51	n

Comments:

- The following values of n can be used:

	8" print line	9" print line
Pica print	2≦n≦80	2≦n≦90
Elite print	3≦n≦96	3≦n≦108
Micron print	3≦n≦120	3≦n≦136
Compressed print	4≦n≦137	4≦n≦155

- If the value of n exceeds the left margin value, ESC+"Q"+n is ignored.
- Setting the right margin clears all data in the line buffer.
- In proportional spacing, the value of n is based on 10 cpi.
- Once the right margin position is set, a change in the character mode will not alter this right margin setting.
- PANEL LOCK in the Function mode affects this command.
(☞ P. 3-21, 3-23)

SKIP PERFORATION:

Sets skip perforation.

Name:	Set:	ESC	"N"	n	(1≦n≦127)DEC	Release:	ESC	"O"
Dec.:		27	78	n			27	79
Hex.:		1B	4E	n			1B	4F

Comments:

- The value of n specifies the number of lines (or n times the current line spacing amount) to be skipped at the bottom of the page.
- If n>128, the value is processed as n−128. If n=128, the command is ignored.
- The skip perforation amount does not change even if the paper feed amount is changed following a skip perforation designation.
- The skip perforation setting is released upon receipt of the page length designation command.
- The skip perforation command overrides the front panel Bottom margin setting
- PANEL LOCK in the Function mode affects this command.
(☞ P. 3-21, 3-23)

HORIZONTAL TAB SETTING:

Sets horizontal tabulations to specified values.

Name:	Set:	ESC	"D"	n_1	n_2...n_x	0	Release:	ESC	"D"	0
Dec.:		27	68	n_1	n_2...n_x	0		27	68	0
Hex.:		1B	44	n_1	n_2...n_x	00		1B	44	00

Comments:

- Horizontal tabs are set from the left margin position.
- Horizontal tabs must be designated such that $n_1<n_2<...<n_x$.
- A maximum of 32 tabs may be set on a single line.
- ESC+"D"+n_1+n_2+...+n_x+0 sets horizontal tab stops. The HT command executes the tab designation.
- In proportional spacing, horizontal tabs are set based on 10 cpi.
- When the left margin is changed, horizontal tabs will be moved based on new margin setting.
- When the printer is powered up, tabs are automatically set every 8 characters.
- If the pitch is altered after designation of horizontal tabs, the tab positions do not move.

HORIZONTAL TAB EXECUTION:

Executes the horizontal TAB as designated by ESC+"D"+n_1+n_2 +...+n_x+0.

Name:	HT
Dec.:	9
Hex.:	09

Comments:

- If the value of the horizontal TAB is less than present column position, then HT is ignored.
- When in underline mode, the blank spaces between consecutive HT print positions are not underlined.

VERTICAL TAB SETTING:

Sets vertical tabulations to specified values.

Name:	Set:	ESC	"B"	n_1	n_2...n_x	0	Release:	ESC	"B"	0
Dec.:		27	66	n_1	n_2...n_x	0		27	66	0
Hex.:		1B	42	n_1	n_2...n_x	00		1B	42	00

Comments:

- VT is set from the top of form position.
- Vertical tabs must be designed such that $n_1 < n_2 ... < n_x$.
- ESC+"B"+n_1+n_2+...+n_x+0 sets vertical tab stops. The VT command executes the tab designation.
- If the paper feed amount is changed after a designation of vertical tabs, the positions do not change.
- VT settings are also released by page length designation commands.
- A maximum of 16 tabs may be set.

VERTICAL TAB EXECUTION:

Executes the vertical TAB as designated by ESC+"B"+n_1+n_2+... +n_x+0, ESC+"b"+m+n_1+n_2+...n_x+0.

Name:	VT
Dec.:	11
Hex.:	0B

Comments:

- When there is no tab setting on a position exceeding the present line, data in the line buffer is printed and paper is fed to the next top of form position (same as FF).
- On power up no vertical tabs have been set; therefore when a VT is sent, the paper advances one line.
- When vertical TAB is cleared by ESC+"B"+0, execution of VT causes data in the line buffer to be printed and does not advance the paper.

VFU CHANNEL SELECTION:

Selects one of eight channels in the Vertical Format Unit (VFU).

Name:	ESC	"/"	n	(0≦n≦7)DEC
Dec.:	27	47	n	
Hex.:	1B	2F	n	

Comments:

- The value of n selects one of eight channels (0~7).
- Channel 0 is the default setting.

VFU SETTING:

Sets the tab position of any channel in the VFU (Vertical Format Unit).

Name:	Set:	ESC	"b"	m	n_1	n_2...n_x	0	Release:	ESC	"b"	m	0
		(0≦m≦7) (1≦x≦16)										
Dec.:		27	98	m	n_1	n_2...n_x	0		27	98	m	0
Hex.:		1B	62	m	n_1	n_2...n_x	00		1B	62	m	00

Comments:

- The value of m selects one of eight channels (0~7).
- A maximum of 16 vertical tabs can be set by each channel.
- Any VFU setting exceeding the page length is ineffective.
- To operate the VFU, input the VT code (11DEC) after selecting the channel via channel selection command (ESC+"/"+n).
- The VFU position does not change even if paper feed amount is altered after VFU setting.
- The VFU setting is also released by the page length designation commands.
- The vertical tab specified with ESC+"B"+n_1+n_2+...n_x+0 is set to VFU channel 0.

BACKSPACE:

Prints data in the line buffer and backspaces one space.

Name: BS
Dec.: 8
Hex.: 08

Comment:

- The backspacing amount will depend upon the pitch set when the BS code is executed.

CARRIAGE RETURN:

Prints data in the line buffer and returns the printhead to the left margin position.

Name: CR
Dec.: 13
Hex.: 0D

Comments:

- Certain computers issue an automatic line feed with a carriage return. Check your computer manual for details.
- When automatic LF is set to ON through the Function mode (☞ P. 3-34), a LF is executed whenever a CR code is executed.

UNIDIRECTION MODE (SINGLE LINE):

Sets unidirectional (left to right) printing mode for one line only.

Name: ESC "<"
Dec.: 27 60
Hex.: 1B 3C

UNIDIRECTION:

Sets unidirectional (left to right) printing mode.

Name:	Set:	ESC	"U"	1	Release:	ESC	"U"	0
Dec.:		27	85	1		27	85	0
Hex.:		1B	55	01		1B	55	00

Comment:

- PANEL LOCK in the Function mode affects this command. (☞ P. 3-21, 3-23)

HALF SPEED PRINTING:

Sets printing to half speed.

Name:	Set:	ESC	"s"	1	Release:	ESC	"s"	0
Dec.:		27	115	1		27	115	0
Hex.:		1B	73	01		1B	73	00

Comment:

- Half speed printing can be set only in the draft pica, draft elite, standard density image, double-speed double-density image, CRT I image and CRT II image modes.

ABSOLUTE HORIZONTAL POSITION:

Moves the print position to an absolute horizontal position from the left margin.

Name:	ESC	"$"	n_1	n_2
Dec.:	27	36	n_1	n_2
Hex.:	1B	24	n_1	n_2

Comments:

- m=total # of units
- Each unit equals 1/60 inch.
- $n_1 = m \bmod 256$
  $n_2 = \text{int}(m/256)$

RELATIVE HORIZONTAL POSITION:

Moves the print position left or right to a relative horizontal position.

Name:	ESC	"\"	n_1	n_2
Dec.:	27	92	n_1	n_2
Hex.:	1B	5C	n_1	n_2

Comments:

- To move right:
  m=total # of units
  To move left:
  m=65536−total # of units
- Each unit equals 1/120 inch in draft mode or 1/180 inch in LQ mode.
- $n_1 = m \text{ MOD } 256$
  $n_2 = \text{int}(m/256)$
- If the resulting movement would place the printhead outside current margins, the command is ignored.
- For example, to move five inches to the right in draft mode:

$m = 5'' \times 120 = 600$

$$256 \overline{)\,600} \quad 2 = n_2$$
$$512$$
$$88 = n_1$$

CANCEL:

Clears all data in the line buffer.

Name:	CAN
Dec.:	24
Hex.:	18

REMOTE PRINTER SELECT:

Selects printer after it has been deselected by DC3.

Name:	DC1	(Device Control 1)
Dec.:	17	
Hex.:	11	

Comment:

- All data sent to the printer between DC3 and DC1 is lost.

REMOTE PRINTER DESELECT:

Deselects printer until it has been selected by DC1.

Name:	DC3	(Device Control 3)
Dec.:	19	
Hex.:	13	

Comment:

- All data sent to the printer between DC3 and DC1 is lost.

DELETE:

Deletes the last character stored in the line buffer.

Name:	DEL
Dec.:	127
Hex.:	7F

Comment:

- Only text characters may be deleted. Bit image data, spacing generated by consecutive TABs, and commands cannot be deleted.

MSB ON:

Sets the Most Significant Bit to 1.

Name:	ESC	">"
Dec.:	27	62
Hex.:	1B	3E

Comments:

- ESC+">" has no effect on bit image data.
- This setting can be released by ESC+"#".
- PANEL LOCK in the Function mode affects this command.
  (☞ P. 3-21, 3-23)

MSB OFF:

Sets the Most Significant Bit to 0.

Name:	ESC	"="
Dec.:	27	61
Hex.:	1B	3D

Comments:

- ESC+"=" has no effect on bit image data.
- This setting can be released by ESC+"#".
- PANEL LOCK in the Function mode affects this command.
  (☞ P. 3-21, 3-23)

CANCELS MSB SETTING:

Sets printer to receive 8th bit "as is".

Name:	ESC	"#"
Dec.:	27	35
Hex.:	1B	23

Comments:

- This setting has no effect on bit image data.
- PANEL LOCK in the Function mode affects this command.
  (☞ P. 3-21, 3-23)

FONT DOWNLOADING:

Defines download characters into specified address locations in RAM. (☞ Section 5.2)

Name:	ESC	"&"	0	n	m	d_0	d_1	d_2	Data
Dec.:	27	38	0	n	m	d_0	d_1	d_2	Data
Hex.:	1B	26	00	n	m	d_0	d_1	d_2	Data

Comments:

- The values n and m are the ASCII address locations of the first and last characters being defined.
- The values of d_0, d_1 and d_2 define the character cell.
  d_0=Left Space d_1=Body d_2=Right Space
- The values of d_0, d_1 and d_2 vary with pitch as follows:

	d_1	$d_0+d_1+d_2$ (total)
Draft	9	12
LQ 10 cpi	29	36
LQ 12 cpi	23	30
LQ 15 cpi	15	24
PS	37	42

- PANEL LOCK in the Function mode affects this command. (☞ P. 3-21, 3-23)
- This command is operational only when the 32K buffer option (KX-P43) is installed.

SELECTS ROM CG OR DOWNLOADED CG:

(☞ Section 5.2)

Name:	ESC	"%"	n	(n=0, 1)
Dec.:	27	37	n	
Hex.:	1B	25	n	

Comments:

- The following values of n can be used.
  n=0: Select ROM Character Generation (CG)
  n=1: Select download CG
- PANEL LOCK in the Function mode affects this command. (☞ P. 3-21, 3-23)

ROM CHARACTER GENERATION SET COPY:

Copies both draft and LQ internal ROM CG font into the downloadable font area.

Name:	ESC	":"	0	n	0	(n=0~7)
Dec.:	27	58	0	n	0	
Hex.:	1B	3A	00	n	00	

Comments:

- The values of n specifies the LQ font to download. Refer to Font Style on page 6-6.
- Upon receipt of the command, all previous downloaded fonts are cleared.
- When altering only part of the ROM CG, use this command before font downloading.
- PANEL LOCK in the Function mode affects this command. (☞ P. 3-21, 3-23)

BELL:

Sounds buzzer for approximately 0.5 second.

Name:	BEL
Dec.:	7
Hex.:	07

RESET PRINTER:

Initializes printer, causing data in the line buffer, but not in the receive buffer, to be cleared.

Name:	ESC	"@"
Dec.:	27	64
Hex.:	1B	40

Comment:

- ☞ P. 3-43

SELECTS CSF:

Selects Cut Sheet Feeder (CSF) mode ON/OFF.

Name:	ESC	EM	n
Dec.:	27	25	n
Hex.:	1B	19	n

Comments:

- The following values of n can be used.
  - n="R": Eject and Load a sheet
  - n="0": Cut Sheet Feeder mode is OFF
  - n="4": Cut Sheet Feeder mode is ON
- PANEL LOCK in the Function mode affects this command. (☞ P. 3-21, 3-23)

Note:

- **If the Cut Sheet Feeder mode is set to ON without installing the CSF, the paper will not feed correctly.**

COLOR:

Selects color printing.

Name:	ESC	"r"	n
Dec.:	27	114	n
Hex.:	1B	72	n

Comments:

- The following values of n can be used.
  - n=0: Black
  - n=1: Red
  - n=2: Blue
  - n=3: Violet
  - n=4: Yellow
  - n=5: Orange
  - n=6: Green
- This command is operational only when the color kit (KX-PCK11) is installed.

7. IBM Proprinter X24E Mode Commands

This chapter covers the software commands when selecting the IBM Proprinter X24E mode. The software commands are grouped into the following classifications:

FONT SELECTION

Name	Function	Page
ESC+"I"+n	Selects print quality	7-5
ESC+"k"+n	Selects print typeface	7-6
ESC+"S"+1	Selects subscript printing	7-6
ESC+"S"+0	Selects superscript printing	7-6
ESC+"T"	Releases sub/superscript printing	7-6

CHARACTER PITCH SELECTION

Name	Function	Page
ESC+":"	Sets elite pitch (12 cpi) printing	7-7
SI	Sets compressed (17 cpi) printing	7-7
ESC+SI	Sets compressed (17 cpi) printing	7-7
DC2	Releases elite and compressed printing	7-7
ESC+"P"+1	Sets proportional spacing	7-7
ESC+"P"+0	Releases proportional spacing	7-7

CHARACTER HIGHLIGHT SELECTION

Name	Function	Page
ESC+"E"	Sets emphasized printing	7-8
ESC+"F"	Releases emphasized printing	7-8
ESC+"G"	Sets double strike printing	7-8
ESC+"H"	Releases double strike printing	7-8
SC	Sets single-line double wide printing	7-9
ESC+SO	Sets single-line double wide printing	7-9
DC4	Releases single-line double wide printing	7-9
ESC+"W"+1	Sets double wide printing	7-9
ESC+"W"+0	Releases double wide printing	7-9
ESC+"["+"@" +4+0+0+0 +m_3+m_4	Sets double high & double wide printing	7-10
ESC+"-"+1	Sets underlining	7-11
ESC+"-"+0	Releases underlining	7-11
ESC+"_"+1	Sets overlining	7-11
ESC+"_"+0	Releases overlining	7-11

IBM Proprinter X24E Mode Commands

CHARACTER SET SELECTION

Name	Function	Page
ESC+"7"	Selects alternate Character Set 1	7-11
ESC+"6"	Selects alternate Character Set 2	7-12
ESC+"["+"T" +4+0+0+0 +n_1+n_2	Changes the current code page	7-12

BIT IMAGE (GRAPHICS) MODE SELECTION

Name	Function	Page
ESC+"K"+n_1 +n_2	Sets 8-pin image standard density (60 dpi)	7-13
ESC+"L"+n_1 +n_2	Sets 8-pin image double density (120 dpi)	7-13
ESC+"Y"+n_1 +n_2	Sets 8-pin image double density/double speed (120 dpi)	7-13
ESC+"Z"+n_1 +n_2	Sets 8-pin image quadruple density (240 dpi)	7-14
ESC+"*"+m +n_1+n_2 (AGM only)	Sets bit image mode selection (8-pin 60, 80, 90, 120, 120D, 240) (24-pin 60, 90, 120, 180, 360)	7-14
ESC+"["+"g" +n_1+n_2+m	Sets bit image mode selection (8-pin 60, 120, 120D, 240) (24-pin 60, 120, 180, 360)	7-15

PAPER FEED SELECTION—Amount

Name	Function	Page
ESC+"0"	Sets paper feed to 1/8 inch (3.2 mm)	7-15
ESC+"1"	Sets paper feed to 7/72 inch (2.5 mm)	7-16
ESC+"2"	Executes line spacing set by ESC+"A"+n	7-16
ESC+"A"+n	Sets paper feed to n/72 inch or n/60 inch	7-16
ESC+"3"+n	Sets paper feed to n/216 inch or n/180 inch	7-17
ESC+"["+"\" +4+0+0+0 +0+n	Selects the base line feed unit for ESC+"3" and ESC+"J"	7-17
ESC+"5"+1	Sets automatic line feed	7-18
ESC+"5"+0	Releases automatic line feed	7-18

PAPER FEED SELECTION

Name	Function	Page
LF	Feeds paper one line	7-18
FF	Feeds paper to next top of form	7-19
ESC+"J"+n	Executes one-line paper feed of n/216 inch or n/180 inch	7-19

PAGE FORMAT CONTROL

Name	Function	Page
ESC+"C"+0+n	Sets page length in inches	7-20
ESC+"C"+n	Sets page length in lines	7-20
ESC+"X"+n_1 +n_2	Sets left and right margin	7-21
ESC+"N"+n	Sets skip perforation	7-22
ESC+"O"	Releases skip perforation	7-22
ESC+"4"	Sets top of form	7-22

TABULATION—Horizontal

Name	Function	Page
ESC+"D"+n_1 +...+n_x+0	Sets horizontal tab	7-23
ESC+"D"+0	Releases horizontal tab	7-23
HT	Executes horizontal tab	7-23

TABULATION—Vertical

Name	Function	Page
ESC+"B"+n_1 +...+n_x+0	Sets vertical tab	7-24
ESC+"B"+0	Releases vertical tab	7-24
VT	Executes vertical tab	7-24
ESC+"R"	Returns to default tabs	7-25

IBM Proprinter X24E Mode Commands

CARRIAGE CONTROL

Name	Function	Page
BS	Prints, then backspaces one character	7-25
CR	Prints a line, then returns carriage	7-26
ESC+"U"+1	Sets uni directional printing	7-26
ESC+"U"+0	Releases uni directional printing	7-26
ESC+"d"+n_1 +n_2	Moves the print position to a relative horizontal position	7-27

DATA CONTROL

Name	Function	Page
CAN	Clears data in line buffer	7-27
DC1	Selects printer remotely	7-27
ESC+"Q"+36	Deselects printer remotely	7-28

DOWNLOAD CHARACTER SELECTION

Name	Function	Page
ESC+"="+n_1 +n_2+35+A_1 +A_2	Defines download font	7-28

MISCELLANEOUS

Name	Function	Page
BEL	Sounds the buzzer	7-28
ESC+"\"+n_1 +n_2	Prints continuously from All Character Chart	7-29
ESC+"^"	Prints one character from All Character Chart	7-29
ESC+"]"	Sets OFF LINE mode	7-29
ESC+"["+"K" +n_1+0+m +36+p_1+p_2	Resets to initial state	7-30

COLOR SELECTION

Name	Function	Page
ESC+"r"+n	Selects print color	7-31

PRINT QUALITY:

Selects print quality and pitch.

Name:	ESC	"I"	n
Dec.:	27	73	n
Hex.:	1B	49	n

Comments:

- The following values of n can be used.
  - n=0: Internal Draft 10 cpi mode
  - n=2: Internal LQ 10 cpi mode
  - n=3: Internal Proportional LQ mode
  - n=4: Download Draft 10 cpi mode
  - n=6: Download LQ 10 cpi mode
  - n=7: Download Proportional LQ mode
  - n=8: Internal Draft 12 cpi mode
  - n=10: Internal LQ 12 cpi mode
  - n=12: Download Draft 12 cpi mode
  - n=14: Download LQ 12 cpi mode
  - n=16: Internal Draft 17 cpi mode
  - n=18: Internal LQ 17 cpi mode
  - n=20: Download Draft 17 cpi mode
  - n=22: Download LQ 17 cpi mode
- PANEL LOCK in the Function mode affects this command. (☞ P. 3-21, 3-23)

TYPEFACE:

Selects LQ typeface.

Name:	ESC	"k"	n
Dec.:	27	107	n
Hex.:	1B	6B	n

Comments:

- The following values of n can be used:
  - n=0: Roman
  - n=1: Sans Serif
  - n=2: Courier
  - n=3: Prestige
  - n=4: Script
  - n=5: OCR-B
  - n=6: Bold PS
  - n=7: Orator
- This command is effective only in letter quality mode.
- IBM characters in locations 0~31$_{DEC}$ (except 19, 20, 21$_{DEC}$) [00~1F$_{HEX}$ (except 13, 14, 15$_{HEX}$)] and 250~255$_{DEC}$ (F0~FF$_{HEX}$) are printed in Courier font, regardless of font selection.
- PANEL LOCK in the Function mode affects this command. (☞ P. 3-21, 3-23)

SUB/SUPERSCRIPT FONT:

Selects sub/superscript font with characters printed in the lower/upper area of the line.

Name:	Set:	ESC	"S"	n	Release:	ESC	"T"
Dec.:		27	83	n		27	84
Hex.:		1B	53	n		1B	54

Comments:

- The following values of n can be used:
  - n=0: Superscript
  - n=1: Subscript
- Sub/superscript font is 2/3 normal character height.
- Sub/superscript characters are normal width.

ELITE PITCH:

Sets printing to 12 characters per inch.

Name:	Set:	ESC	":"	Release:	DC2
Dec.:		27	58		18
Hex.:		1B	3A		12

Comment:

- PANEL LOCK in the Function mode affects this command.
(☞ P. 3-21, 3-23)

COMPRESSED PITCH:

Sets printing to 17 characters per inch.

Name:	Set:	SI	or	ESC	SI	Release:	DC2
Dec.:		15	or	27	15		18
Hex.:		0F	or	1B	0F		12

Comment:

- PANEL LOCK in the Function mode affects this command.
(☞ P. 3-21, 3-23)

PROPORTIONAL SPACING:

Sets proportional spacing between characters.

Name:	Set:	ESC	"P"	1	Release:	ESC	"P"	0
Dec.:		27	80	1		27	80	0
Hex.:		1B	50	01		1B	50	00

Comment:

- PANEL LOCK in the Function mode affects this command.
(☞ P. 3-21, 3-23)

EMPHASIZED PRINTING:

Sets printing to twice the original horizontal dot density.

Name:	Set:	ESC	"E"	Release:	ESC	"F"
Dec.:		27	69		27	70
Hex.:		1B	45		1B	46

Comments:

- Emphasized characters are printed at half speed (100 cps in draft pica pitch).
- PANEL LOCK in the Function mode affects this command. (☞ P. 3-21, 3-23)

DOUBLE STRIKE PRINTING:

Sets double strike printing.

Name:	Set:	ESC	"G"	Release:	ESC	"H"
Dec.:		27	71		27	72
Hex.:		1B	47		1B	48

Comments:

- Double strike printing prints each line twice, with the second line slightly below the first to create a bold appearance.
- PANEL LOCK in the Function mode affects this command. (☞ P. 3-21, 3-23)

DOUBLE WIDE PRINTING—SINGLE LINE:

Sets double wide (expanded) printing for one line only.

Name:	Set:	SO	or	ESC	SO	Release:	DC4	or	ESC	"W"	0
Dec.:		14		27	14		20		27	87	0
Hex.:		0E		1B	0E		14		1B	57	00

Comments:

- Single line double wide printing is released when:
  - —a LF, FF or VT is executed.
  - —a CR is executed.
  - —DC4 or ESC+"W"+0 is executed.
- PANEL LOCK in the Function mode affects this command.
  (☞ P. 3-21, 3-23)

DOUBLE WIDE PRINTING:

Sets double wide (expanded) printing.

Name:	Set:	ESC	"W"	1	Release:	ESC	"W"	0
Dec.:		27	87	1		27	87	0
Hex.:		1B	57	01		1B	57	00

Comments:

- DC4 will not release the double wide printing set by ESC+"W"+1.
- PANEL LOCK in the Function mode affects this command.
  (☞ P. 3-21, 3-23)

DOUBLE HIGH AND DOUBLE WIDE PRINTING:

Sets printing to double high, double wide or both at the same time.

Name:	ESC	"["	"@"	4	0	0	0	m_3	m_4
Dec.:	27	91	64	4	0	0	0	m_3	m_4
Hex.:	1B	5B	40	04	00	00	00	m_3	m_4

Comments:

- The value of m_3 selects both the line feed and character height as follows:

m_3	Function	
	Line feed	Character height
0	Unchanged	Unchanged
1	Unchanged	Single-line
2	Unchanged	Double-high
16	Single	Unchanged
17	Single	Single-high
18	Single	Double-high
32	Double	Unchanged
33	Double	Single-high
34	Double	Double-high

- The value of m_4 selects the character width as follows:
  m_4=0: No change
  m_4=1: Single-width
  m_4=2: Double-width
- PANEL LOCK in the Function mode affects this command. (☞ P. 3-21, 3-23)
- In the pull tractor mode, this command will not reverse feed paper correctly and the resulting printout may not be correct.

UNDERLINING:

Sets continuous underlining of characters.

Name:	Set:	ESC	"-"	1	Release:	ESC	"-"	0
Dec.:		27	45	1		27	45	0
Hex.:		1B	2D	01		1B	2D	00

Comments:

- Bit image data, spaces set by the HT code and IBM Graphic characters will not be underlined.
- Pin No. 24 of the printhead is used for underlining.

OVERLINING:

Sets continuous overlining of characters.

Name:	Set:	ESC	"_"	1	Release:	ESC	"_"	0
Dec.:		27	95	1		27	95	0
Hex.:		1B	5F	01		1B	5F	00

Comments:

- Bit image data, spaces set by the HT code, IBM graphic characters will not be overlined.
- Pin No. 1 of the printhead is used for overlining.

IBM CHARACTER SET I:

Selects IBM Proprinter X24E character set 1.

Name:	ESC	"7"
Dec.:	27	55
Hex.:	1B	37

Comments:

- Refer to table in Appendix A
- PANEL LOCK in the Function mode affects this command.
(☞ P. 3-21, 3-23)

IBM CHARACTER SET II:

Selects IBM Proprinter X24E character set 2.

Name:	ESC	"6"
Dec.:	27	54
Hex.:	1B	36

Comments:

- Refer to table in Appendix A.
- PANEL LOCK in the Function mode affects this command. (☞ P. 3-21, 3-23)

SETS CODE PAGE

Changes the current code page.

Name:	ESC	"["	"T"	4	0	0	0	n_1	n_2
Dec.:	27	91	84	4	0	0	0	n_1	n_2
Hex.:	1B	5B	54	04	00	00	00	n_1	n_2

Comments:

- The values of n_1 and n_2 select the code pages as follows:
  - $n_1=00_H$, $n_2=00_H$: Current
  - $n_1=01_H$, $n_2=B5_H$: USA (437)
  - $n_1=03_H$, $n_2=52_H$: Multilingual (850)
  - $n_1=03_H$, $n_2=5C_H$: Portugal (860)
  - $n_1=03_H$, $n_2=5F_H$: Canada French (863)
  - $n_1=03_H$, $n_2=61_H$: Norway (865)
  - Except the above: Downloaded font
- PANEL LOCK in the Function mode affects this command. (☞ P. 3-21, 3-23)
- Refer to table in Appendix A.

8-PIN STANDARD DENSITY GRAPHICS:

Sets standard density graphic mode [60 dots per inch (25.4 mm)].
(☞ P. 5-18—5-22)

Name:	ESC	"K"	n_1	n_2	Data
Dec.:	27	75	n_1	n_2	Data
Hex.:	1B	4B	n_1	n_2	Data

8-PIN DOUBLE DENSITY GRAPHICS:

Sets double density graphic mode [120 dots per inch (25.4 mm)].
(☞ P. 5-18—5-22)

Name:	ESC	"L"	n_1	n_2	Data
Dec.:	27	76	n_1	n_2	Data
Hex.:	1B	4C	n_1	n_2	Data

DOUBLE SPEED, DOUBLE DENSITY GRAPHICS:

Sets double speed, double density graphics mode [120 dots per inch (25.4 mm)]. (☞ P. 5-18—5-22)

Name:	ESC	"Y"	n_1	n_2	Data
Dec.:	27	89	n_1	n_2	Data
Hex.:	1B	59	n_1	n_2	Data

Comment:

- Horizontal adjacent dots cannot be printed.

8-PIN QUADRUPLE DENSITY GRAPHICS:

Sets quadruple density graphics mode [240 dots per inch (25.4 mm)].
(☞ P. 5-18—5-22)

Name:	ESC	"Z"	n_1	n_2	Data
Dec.:	27	90	n_1	n_2	Data
Hex.:	1B	5A	n_1	n_2	Data

Comment:

- Horizontal adjacent dots cannot be printed.

BIT IMAGE MODE SELECTION (AGM):

Selects one of the AGM 8-pin or 24-pin bit image graphic modes.
(☞ P. 5-18—5-24)

Name:	ESC	"*"	m	n_1	n_2	Data
Dec.:	27	42	m	n_1	n_2	Data
Hex.:	1B	2A	m	n_1	n_2	Data

Comments:

- The following table illustrates the various modes based upon the values of m.

m	Pin	Dots/Inch	
0	8	60	Standard Density
1	8	120	Double Density
2	8	120	Double Speed, Double Density
3	8	240	Quadruple Density
4	8	80	CRT I
6	8	90	CRT II
32	24	60	Standard Density
33	24	120	Double Density
38	24	90	CRT III
39	24	180	Triple Density
40	24	360	Hex Density

- When m=2, 3, 40, horizontal adjacent dots cannot be printed.
- The values n_1 and n_2 indicate the number of graphic columns to be printed. (☞ P. 5-18—5-24)
- This command is effective only when AGM mode is set to ON through the Function mode. (☞ P. 3-30, 3-34, 5-24)

BIT IMAGE MODE SELECTION:

Selects one of the 8-pin or 24-pin bit image graphic modes.
(☞ P. 5-18—5-24)

Name:	ESC	"["	"g"	n_1	n_2	m	Data
Dec.:	27	91	103	n_1	n_2	m	Data
Hex.:	1B	5B	67	n_1	n_2	m	Data

Comments:

- The following table illustrates the various modes based upon the values of m.

m	Pin	Dots/Inch	
0	8	60	Standard Density
1	8	120	Double Density
2	8	120	Double Speed, Double Density
3	8	240	Quadruple Density
8	24	60	Standard Density
9	24	120	Double Density
11	24	180	Triple Density
12	24	360	Hex Density

- When m=2, 3, 12, horizontal adjacent dots cannot be printed.
- The values n_1 and n_2 indicate the number of graphic columns to be printed. (☞ P. 5-18—5-24)

1/8 INCH PAPER FEED:

Sets paper feed amount to 1/8 inch (3.2 mm).

Name:	ESC	"0"
Dec.:	27	48
Hex.:	1B	30

Comment:

- PANEL LOCK in the Function mode affects this command.
(☞ P. 3-21, 3-23)

7/72 INCH PAPER FEED:

Sets paper feed amount to 7/72 inch (2.5 mm).

Name:	ESC	"1"
Dec.:	27	49
Hex.:	1B	31

Comment:

- PANEL LOCK in the Function mode affects this command.
  (☞ P. 3-21, 3-23)

LINE SPACING:

Executes line spacing set by ESC+"A"+n.

Name:	ESC	"2"
Dec.:	27	50
Hex.:	1B	32

Comment:

- PANEL LOCK in the Function mode affects this command.
  (☞ P. 3-21, 3-23)

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n/72 INCH PAPER FEED SELECTION:

Sets paper feed amount to n/72 inch or n/60 inch (AGM).

Name:	ESC	"A"	n	(0≦n≦255)DEC
Dec.:	27	65	n	
Hex.:	1B	41	n	

Comments:

- ESC+"2" must be input after ESC+"A"+n for n/72 inch paper feed to become effective (when AGM is set to OFF only).
- In the AGM mode, this command sets one line paper feed of n/60 inch.
- PANEL LOCK in the Function mode affects this command.
  (☞ P. 3-21, 3-23)

n/216 INCH PAPER FEED:

Sets paper feed amount to n/216 inch or n/180 inch (AGM).

Name:	ESC	"3"	n	(0≦n≦255)DEC
Dec.:	27	51	n	
Hex.:	1B	33	n	

Comments:

- The paper feed amount is not exactly n/216 inch, for the minimum unit is 1/360 inch.
- In the AGM mode, this command sets one line paper feed of n/180 inch.
- PANEL LOCK in the Function mode affects this command.
(☞ P. 3-21, 3-23)

PAPER FEED BASE UNIT:

Selects base unit for ESC+"3" and ESC+"J".

Name:	ESC	"["	"\"	4	0	0	0	0	n
Dec.:	27	91	92	4	0	0	0	0	n
Hex.:	1B	5B	5C	04	00	00	00	00	n

Comment:

- The following values of n can be used:
  - n=180 1/180 inch base unit
  - n=216 1/216 inch base unit

AUTOMATIC LINE FEED MODE:

Automatically executes a line feed following a carriage return.

Name:	Set:	ESC	"5"	1	**Release:**	ESC	"5"	0
Dec.:		27	53	1		27	53	0
Hex.:		1B	35	01		1B	35	00

Comment:

- PANEL LOCK in the Function mode affects this command. (☞ P. 3-21, 3-23)

LINE FEED (LF):

Feeds paper to next line position after printing data in the line buffer.

Name:	LF
Dec.:	10
Hex.:	0A

Comments:

- The amount of spacing generated by LF is determined by the paper feed commands or the EZ Set Operator Panel.
- When the new line position falls within the skip perforation area, the paper advances to the next top of form position.
- When Auto CR is set to ON through the Function mode, a Carriage Return command (CR) is added to each Line Feed (LF).

FORM FEED (FF):

Feeds paper to next top of form position after printing data in the line buffer.

Name:	FF
Dec.:	12
Hex.:	0C

Comment:

- The amount of spacing generated by FF is determined by the page length commands or the EZ Set Operator panel.

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n/216 INCH SINGLE LINE FEED:

Feeds paper n/216 inch or n/180 inch (AGM) after printing data in the line buffer.

Name:	ESC	"J"	n	$(0 \leqq n \leqq 255)_{DEC}$
Dec.:	27	74	n	
Hex.:	1B	4A	n	

Comments:

- When Auto CR is set to ON through the Function mode, a Carriage Return command (CR) is added to each line feed.
- The paper feed amount is not exactly n/216 inch, for the minimum unit is 1/360 inch.
- *In the AGM mode, this command sets one line paper feed of* n/180 inch.

PAGE LENGTH (INCHES):

Sets page length in inches.

Name:	ESC	"C"	0	n	(1≦n≦255)DEC
Dec.:	27	67	0	n	
Hex.:	1B	43	00	n	

Comments:

- Upon receipt of ESC+"C"+0+n, the present line position becomes the top of form position.
- ESC+"C"+0+n releases the skip perforation settings.
- The page length does not change even if the paper feed amount is changed.
- The terms "form" and "page" are interchangeable.
- PANEL LOCK in the Function mode affects this command.
(☞ P. 3-21, 3-23)

PAGE LENGTH (LINES):

Sets page length in number of lines.

Name:	ESC	"C"	n		(1≦n≦255)DEC
Dec.:	27	67	n		
Hex.:	1B	43	n		

Comments:

- Upon receipt of ESC+"C"+n, the present line position becomes the top of form position.
- If n=0, page length returns to the inch designation.
- ESC+"C"+n releases the skip perforation settings.
- The page length does not change even if the paper feed amount is changed.
- The terms "form" and "page" are interchangeable.
- PANEL LOCK in the Function mode affects this command.
(☞ P. 3-21, 3-23)

MARGIN SET:

Sets positions of left and right margins.

Name:	ESC	"X"	n_1	n_2
Dec.:	27	88	n_1	n_2
Hex.:	1B	58	n_1	n_2

Comments:

- The following values of n_1 (left) and n_2 (right) can be used:

	8" print line		9" print line	
Pica	$1 \leqq n_1 \leqq 78$	$3 \leqq n_2 \leqq 80$	$1 \leqq n_1 \leqq 88$	$3 \leqq n_2 \leqq 90$
Elite	$1 \leqq n_1 \leqq 93$	$4 \leqq n_2 \leqq 96$	$1 \leqq n_1 \leqq 105$	$4 \leqq n_2 \leqq 108$
Compressed	$1 \leqq n_1 \leqq 133$	$5 \leqq n_2 \leqq 137$	$1 \leqq n_1 \leqq 151$	$5 \leqq n_2 \leqq 155$

To keep current left or right margin, set $n_1=0$ or $n_2=0$.

- Any right margin designation to the left of the left margin position is ignored.
- Setting the margins clear all data in the line buffer.
- Once the margin position is set, a change in the pitch will not alter this margin setting.
- PANEL LOCK in the Function mode affects this command.
(☞ P. 3-21, 3-23)

SKIP PERFORATION:

Sets skip perforation.

Name:	Set:	ESC	"N"	n	(0≦n≦255)ETC	Release:	ESC	"O"
Dec.:		27	78	n			27	79
Hex.:		1B	4E	n			1B	4F

Comments:

- The value of n specifies the number of lines (or n times the current line spacing amount) to be skipped at the bottom of the page.
- The skip perforation amount does not change even if the paper feed amount is changed following a skip perforation designation.
- The skip perforation is released upon receipt of the page length designation command.
- The skip perforation command overrides the front panel Bottom margin setting.
- PANEL LOCK in the Function mode affects this command.
(☞ P. 3-21, 3-23)

TOP OF FORM:

Sets current paper position as the new top of form.

Name:	ESC	"4"
Dec.:	27	52
Hex.:	1B	34

HORIZONTAL TAB SETTING:

Sets horizontal tabulations to specified values.

Name:	Set:	ESC	"D"	n_1	n_2...n_x	0	_Release:	ESC	"D"	0
Dec.:		27	68	n_1	n_2...n_x	0		27	68	0
Hex.:		1B	44	n_1	n_2...n_x	00		1B	44	00

Comments:

- Horizontal tabs are set from the left margin position.
- Horizontal tabs must be designated such that $n_1<n_2<...<n_x$.
- A maximum of 32 tabs may be set on a single line.
- ESC+"D"+n_1+n_2+...+n_x+0 sets horizontal tab stops. The HT command executes the tab designation.
- In proportional spacing, horizontal tabs are set based on 10 cpi.
- If the character pitch is altered after designation of horizontal tabs, the tab positions change.
- When the left margin is changed, horizontal tabs will be moved based on the new margin setting.
- When the printer is powered up, tabs are automatically set every 8 characters.

HORIZONTAL TAB EXECUTION:

Executes the horizontal TAB as designated by ESC+"D"+n_1+n_2+...+n_x+0.

Name:	HT
Dec.:	9
Hex.:	09

Comments:

- If the value of the horizontal TAB is less than the present column position, that HT is ignored.
- When in underline mode, the blank spaces between consecutive HT print positions are not underlined.

VERTICAL TAB SETTING:

Sets vertical tabulation to specified values.

Name:	Set:	ESC	"B"	n_1	n_2...n_x	0	Release:	ESC	"B"	0
Dec.:		27	66	n_1	n_2...n_x	0		27	66	0
Hex.:		1B	42	n_1	n_2...n_x	00		1B	42	00

Comments:

- VT is set from the top of form position.
- Vertical tabs must be designed such that $n_1 < n_2 ... < n_x$.
- ESC+"B"+n_1+n_2+...+n_x+0 sets vertical tab stops. The VT command executes the tab designation.
- If the paper feed amount is changed after a designation of vertical tabs, the tab positions do not change.
- A maximum of 64 tabs may be set.

VERTICAL TAB EXECUTION:

Executes the vertical TAB as designated by ESC+"B"+n_1+n_2+...+n_x+0.

Name:	VT
Dec.:	11
Hex.:	0B

Comments:

- When there is no tab setting on a position exceeding the present line, data in the line buffer is printed and the paper is fed one line (same as LF).
- When vertical TAB has not been set by ESC+"B"+n_1+n_2+...+n_x+0, execution of VT causes data in the line buffer to be printed and advances the paper one line (same function as LF).

ALL TAB INITIAL CLEAR:

Sets all tabs to power on settings.

Name:	ESC	"R"
Dec.:	27	82
Hex.:	1B	52

Comment:

- This command sets horizontal tabs at every 8th position and clears all vertical tabs.

BACKSPACE:

Prints data in the line buffer and backspaces one space.

Name:	BS
Dec.:	8
Hex.:	08

Comment:

- The backspacing amount will depend upon the pitch set when the BS *code is executed.*

CARRIAGE RETURN:

Prints all data in the line buffer and returns the printhead to the left margin position.

Name:	CR
Dec.:	13
Hex.:	0D

Comments:

- Certain computers issue an automatic line feed with a carriage return. Check your computer manual for details.
- When auto LF is set to ON through the Function mode, a Line Feed command (LF) is added to each Carriage Return (CR).

UNIDIRECTION MODE:

Sets unidirectional (left to right) printing mode.

Name:	Set:	ESC	"U"	1		Release:	ESC	"U"	0
Dec.:		27	85	1			27	85	0
Hex.:		1B	55	01			1B	55	00

Comment:

- PANEL LOCK in the Function mode affects this command. (☞ P. 3-21, 3-23)

RELATIVE HORIZONTAL POSITION:

Moves the print position toward the right $n/120$ inch.

Name:	ESC	"d"	n_1	n_2
Dec.:	27	100	n_1	n_2
Hex.:	1B	64	n_1	n_2

Comments:

- n_1=m MOD 256
  n_2=Int ($m/256$)
- m=total # of units
- Each unit equals 1/120 inch.
- When underlining or overlining, spaces created by the move are underlined or overlined.

CANCEL:

Clears all data in the line buffer.

Name:	CAN
Dec.:	24
Hex.:	18

REMOTE PRINTER SELECT:

Selects printer after it has been deselected by ESC+"Q"+36.

Name:	DC1	(Device Control 1)
Dec.:	17	
Hex.:	11	

Comment:

- All data sent to the printer between ESC+"Q"+36 and DC1 is lost.

REMOTE DESELECT PRINTER:

Deselects printer unit it has been selected by DC1.

Name:	ESC	"Q"	36
Dec.:	27	81	36
Hex.:	1B	51	24

Comment:

- All data sent to the printer between DC3 and DC1 is lost.

FONT DOWNLOADING:

Defines download characters into specified address locations in RAM. (☞ Section 5.2)

Name:	ESC	"="	n_1	n_2	35	A_1	A_2	Data
Dec.:	27	61	n_1	n_2	35	A_1	A_2	Data
Hex.:	1B	3D	n_1	n_2	23	A_1	A_2	Data

Comments:

- This command is operational only when the 32K buffer option (KX-P43) is installed.
- The values n_1 and n_2 indicate the number of data bytes to be downloaded.
- The values A_1 and A_2 are the low order and high order address location of the character being defined.
- When $n_1=n_2=0$, all previously downloaded characters are cleared.
- PANEL LOCK in the Function mode affects this command. (☞ P. 3-21, 3-23)

BELL:

Sounds the buzzer for approximately 0.5 second.

Name:	BEL
Dec.:	7
Hex.:	07

ALL CHARACTER CHART PRINTING (Continuous):

Prints continuously from the All Character Chart.

Name:	ESC	"\"	n_1	n_2
Dec.:	27	92	n_1	n_2
Hex.:	1B	5C	n_1	n_2

Comments:

- Refer to IBM All Character Chart (Appendix A).
- The values specified for n_1 and n_2 indicate how many characters to print from All Character Chart, calculating the total count with this formula; Total count=$n_2 \times 256 + n_1$.
- The data following this command will be printed as characters from the All Character Chart.

All CHARACTER CHART PRINTING (Single):

Prints a single character from the All Character Chart.

Name:	ESC	"^"
Dec.:	27	94
Hex.:	1B	5E

Comments:

- Only the first byte of data following this command will be printed as a character from the All Character Chart.
- Refer to the IBM All Character Chart (Appendix A).

SETS OFF LINE MODE:

Stops printing and sets printer to OFF LINE mode.

Name:	ESC	"j"
Dec.:	27	106
Hex.:	1B	6A

Comment:

- When you desire to print again, press the ON LINE switch.

INITIAL STATE:

Resets to initial state.

Name:	ESC	"["	"K"	n_1	0	m	36	p_1	p_2
Dec.:	27	91	75	n_1	0	m	36	p_1	p_2
Hex.:	1B	5B	4B	n_1	00	m	24	p_1	p_2

Comments:

- The following values of n_1 can be used:
  - n_1=1: Initialize only
  - n_1=3: Initialize and set by p_1
  - n_1=4: Initialize and set by p_1 and p_2

- The following table illustrates the various modes based upon the value of m:

m	Initialization	Download	
0	Current MACRO	Not cleared	Not saved
1	Current MACRO	Cleared	Not saved
4	FACTORY setting	Not cleared	Not saved
5	FACTORY setting	Cleared	Not saved
254	Current MACRO	Cleared	Saved
255	FACTORY setting	Cleared	Saved

- The following tables illustrate the parameter specifications.

p_1 (Parameter 1):

Bit		OFF	ON
7	Discard byte	Process this byte	Ignore this byte
6	Not used		
5	Paper out alarm	Enable	Disable
4	Auto CR	OFF	ON
3	Auto LF	OFF	ON
2	Form length	11"	12"
1	Zero slash	Normal	Slashed Zero
0	Character set	Set 1	Set 2

p_2 (Parameter 2):

Bit		OFF	ON
7	Discard byte	Process this byte	Ignore this byte
6	Select code page	USA	Multilingual
5	Not used	—	—
4	Not used	—	—
3	Not used	—	—
2	Not used	—	—
1	Not used	—	—
0	Cut sheet feeder	Disable	Enable

COLOR

Selects color printing.

Name:	ESC	"r"	n
Dec.	27	114	n
Hex.	1B	72	n

Comments:

- The following values of n can be used.
  - n=0: Black
  - n=1: Red
  - n=2: Blue
  - n=3: Violet
  - n=4: Yellow
  - n=5: Orange
  - n=6: Green
- This command is operational only when the color kit (KX-PCK11) is installed.

8. Interfacing

Parallel Interfacing

Communication with a computer is accomplished through a parallel interface based on the Centronics standard.

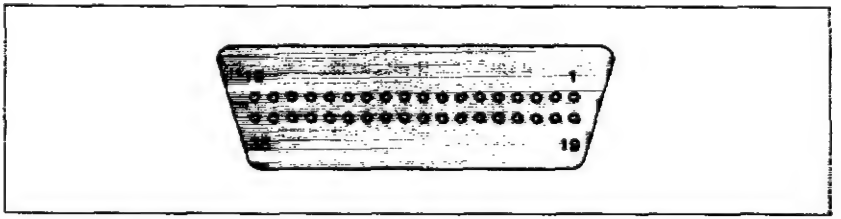
Specifications:

- data transfer speed: 1000 cps minimum
- synchronization: external STROBE pulse
- logic levels: TTL
- handshaking: BUSY and $\overline{\text{ACK}}$ signals
- connector type: 57-30360 (AMPHENOL) or equivalent
- cable: use a shielded cable (6'5"/1.95 meters) or less in length.

When the printer is processing data, the BUSY signal is high. The printer will not accept new data from the computer. After the processing is completed, the BUSY signal goes low. (The BUSY signal is also high when the printer is OFF LINE). When the busy signal occurs, the $\overline{\text{ACK}}$ signal goes low indicating to the computer that the data has been processed and the printer is ready to accept more data. This handshaking routine occurs each time a character is sent to the printer.

	BUSY	SLCT	PO	$\overline{\text{ERROR}}$
ON LINE	LOW	HIGH	LOW	HIGH
OFF LINE	HIGH	LOW	LOW	LOW
PAPER OUT	HIGH	LOW	HIGH	LOW

Printer Status signals



Parallel Interface Connector (Printer side)

Signal pin	Return side pin	Signal	Direction
1	19	$\overline{\text{STB}}$	Input
2	20	DATA 1	
3	21	DATA 2	
4	22	DATA 3	
5	23	DATA 4	
6	24	DATA 5	
7	25	DATA 6	
8	26	DATA 7	
9	27	DATA 8	
10	28	$\overline{\text{ACK}}$	Output
11	29	BUSY	
12		PO	
13		SLCT	
14		$\overline{\text{AUTO FEED XT}}$	Input
15			
16		SG	
17		FG	
18		+5 V	Output
31	30	$\overline{\text{PRIME}}$	Input
32		$\overline{\text{ERROR}}$	Output
33		SG	
34			
35			
36			

Pin Configuration (Parallel)

Notes:

- "INPUT" refers to a signal coming into the printer. "OUTPUT" denotes a signal exiting the printer.
- "RETURN" denotes the return side wire of a twisted pair cable and is connected to signal ground.
- All interface signals are at TTL (Transistor-Transistor-Logic) levels.

Connector pin signals

$\overline{\text{STB}}$...STROBE

- This is a synchronizing input signal to read data into the printer.
- This signal is normally high. Data is read in when it goes low.
- The pulse must be low for at least 1 microsecond.

DATA 1–DATA 8

- These are the input signals which carry the 8 data bits of information.
- The signal is read in synchronization with the STROBE pulse. A high level indicates a logical "1".
- The signal must be present 0.5 microsecond before and after the STROBE pulse.

$\overline{\text{ACK}}$...ACKNOWLEDGE

- This is an output signal to the computer indicating that the printer is ready to receive the next block of data. It is sent out when the BUSY signal drops from high to low. Therefore, it can be thought of as a data request pulse.
- The signal is normally high. When the condition becomes true, the signal goes low.
- The $\overline{\text{ACK}}$ signal is automatically sent whenever the printer is switched ON LINE.

BUSY

- This output signal indicates the status of the printer. The signal is high when the printer is busy and cannot receive data.
- The signal is high under the following conditions:
  1. receive buffer full
  2. printer is processing data
  3. printer is OFF LINE
  4. printer is in an error condition

PO...PAPER OUT

- This output signal indicates that paper out detector detects the absence of paper.
- The signal is normally low and goes high during a "Paper Out" condition.

SLCT...SELECT

- SELECT is an output signal which indicates the ON LINE or OFF LINE state of the printer. The signal is high in the ON LINE state and low when OFF LINE.
- The printer enters the ON LINE state:
  1. when the printer is turned on
  2. when $\overline{\text{PRIME}}$ is received
  3. when the RESET command is received
  4. *when the ON LINE switch is pressed*
- The printer enters the OFF LINE state:
  1. when the printer is out of paper
  2. when the printer is switched OFF LINE

$\overline{\text{AUTO FEED XT}}$ ($\overline{\text{AFXT}}$)

- This input signal determines if a line feed (LF) command will be added to each carriage return (CR).
- When $\overline{\text{AFXT}}$ is low, CR+LF action occurs. When $\overline{\text{AFXT}}$ is high, only a carriage return is performed.
- **Auto LF setting in the Function mode can alter the response by the printer to an $\overline{\text{AFXT}}$ signal.** If auto LF is ON, the printer will perform a CR+LF regardless of the level of the incoming signal. When auto LF is OFF, this automatic action is disabled.

SG...SIGNAL GROUND

- The twisted pair return wires (pins 19–30) are connected to signal ground.

FG...FRAME GROUND

- Frame ground is the same as chassis ground.

+5 V

- This is for evaluation only. It should not be used to supply power for external equipment.

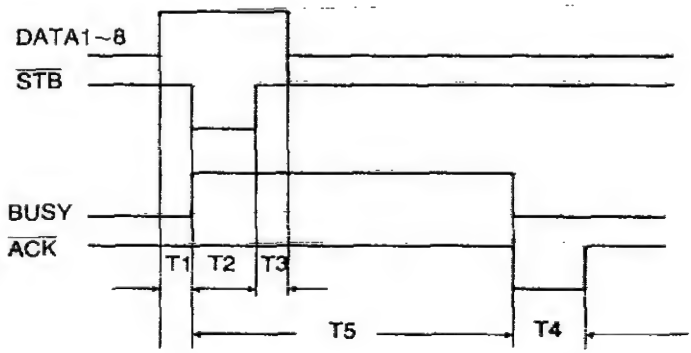
$\overline{\text{PRIME}}$

- This input signal is used to initialize the printer. The signal is normally high and goes low to reset the printer. It can be received anytime during printer operation.

$\overline{\text{ERROR}}$

- This output signal is an "error" or "fault" condition. Normally high, this signal goes low when an error occurs. An error condition can be caused by:
  1. a "Paper Out" condition
  2. the printer is OFF LINE
  3. an overload condition exists

Timing Chart (When normal printing code is received)



T1 .... 0.5 μs (Min)
T2 .... 1 μs (Min)
T3 .... 0.5 μs (Min)
T4 .... 5 μs (Max)
T5 .... 1 ms or less when buffer is not full
1 s or less when buffer is full

Timing Diagram

9. Maintenance

The printer does not require any routine maintenance. However, reasonable care of the printer will extend its life. The following precautions and perlodic measures are recommended:

Precautions

- Keep all liquids away from the printer. Accidental spillage of a liquid into the printer can cause severe damage.

- Do not block the air flow around the printer. Do not place books, paper, or other items on top of the printer.

- Special care should be taken to protect the printer if it is used in an unfriendly environment such as a machine shop, a dusty or sandy area, etc.

- The life of the printhead can be extended by observing a few simple precautions.

  — Do not operate the printer without paper and a ribbon cassette installed.

  — Avoid prolonged use without allowing the printhead time to cool.

  — Do not obstruct the movement of the printhead while in operation.

- If the printer is not going to be used for an extended period, unplug the power cord.

Periodic Maintenance

- Cleaning the unit is the most important action the user can perform. The frequency of cleaning is dependent upon the environment.

  — Turn the power OFF.

  — Clean the case and covers with a soft cloth. Use any mild commercial cleaner on the cloth, do not spray directly on the printer.

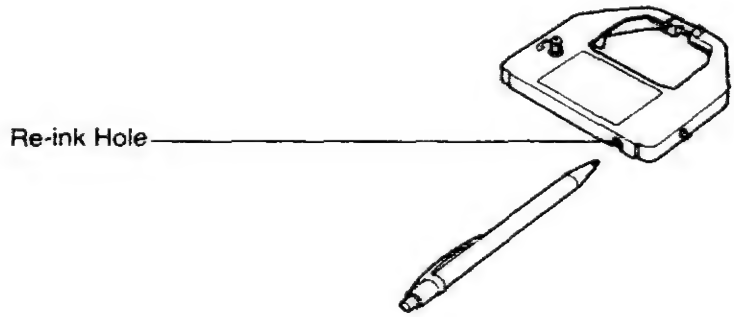
—Remove the top and the smoked plastic covers. Vacuum or dust the inside area of the unit. Be very careful not to damage the flex ribbon cable and the carriage drive belt.

—The platen should be cleaned with denatured alcohol only.

—The carriage guide bar can be lubricated with a very light oil. Contact your Authorized Panasonic Service Center for advice on lubrication.

Ribbon Cassette

A single ribbon permits the printing of about 3 million characters. When the printing starts to fade, gently push the counter spring in the ribbon cassette hole with the tip of a ballpoint pen or other object. **Once the ribbon cassette is mounted onto the carriage and printing is performed for a short time, the characters will become darker.**



Note:

- Do not re-ink the ribbon before printing starts to fade. If the ribbon has too much ink, the characters may smear when printed.
- Wear and tear of the printhead pins may cause serious damage to the ribbon and cause the printing to fade. In such cases the printer needs servicing.

Troubleshooting

Most problems associated with the printer can be traced to improper setup, installation, or cabling. The error messages shown on the display (☞ Table 9.2) and the following table will assist the user in identifying and correcting some of the more common problems. If you need additional help, contact the store from which the unit was purchased.

Symptom	Possible Cause	Probable Solution
Ink smears	Head gap lever is not in the proper position	Move the lever toward the lower position (←) until ink doesn't smear (☞ P. 2-11)
Printout is faint	Head gap lever is not in proper position	Set the lever to the proper position (☞ P. 2-11)
Head moves but does not print	Ribbon not installed correctly	Re-insert ribbon (☞ P. 2-4—2-6)
	Head gap lever is not in proper position	Set the lever to the proper position (☞ P. 2-11)
Printer does not power up	No AC power	Check power cord (☞ P. 2-7)
Power is on but printer does not print	Printer is not ON LINE	Press ON LINE switch
	Interface cable is not properly connected	Secure connection (☞ P. 2-8)
Paper out sensor is inoperative	P.O.DETECT is OFF	Set P.O.DETECT to ON (☞ P. 3-31, 3-36)
Buzzer sounds when installing single sheet	Paper feed selector in "PUSH" or "PULL" position	Set selector to "" position (☞ P. 2-11)
Paper wrinkles when using tractor feed	No reverse tension on paper	Set paper supply lower than printer

Table 9.1 Troubleshooting (Continued)

Symptom	Possible Cause	Probable Solution
Printer can't load single sheet in Friction mode	C.S.F. is ON	Set C.S.F. to OFF when not using the Cut Sheet Feeder (☞ P. 3-32, 3-37)
Unexpected characters appear in printing	Emulation is set incorrectly	Check printer driver of your software package and set emulation accordingly (☞ P. 2-28, 3-17)
KX-P43 (buffer chip) is installed but cannot download	OPT RAM is set to BUFFER	Set OPT RAM to DOWNLOAD (☞ P. 3-33, 3-37)
Printout is double-spaced	AUTO LF is ON	Set AUTO LF to OFF (☞ P. 3-30, 3-34)
Keeps printing on the same line	Computer is not sending a LF command	Set AUTO LF to ON (☞ P. 3-30, 3-34)
Wrong character set printed	Wrong character set selected	Set the character set as required (☞ P. 3-28, 3-29)
Cannot change print style from computer	FONT and PITCH modes are set	Set PANEL LOCK to OFF (☞ P. 3-21, 3-23)
KX-PS14 (serial interface board) is installed but cannot print	I/F is set to PARALLEL	Set I/F to SERIAL and select desired parameters (☞ KX-PS14 manual)
Cannot use parallel interface when installing serial interface board	KX-PS14 I/F is set to SERIAL	Set I/F to PARALLEL (☞ KX-PS14 manual)
	KX-PS13 Parallel interface cannot be used when a KX-PS13 is installed	Remove KX-PS13 when using parallel interface (☞ KX-PS13 manual)
Prints in 2 different colors	Yellow color gap lever of color kit is not in proper position	Set color gap lever of color kit to proper position (☞ "Color Adjustment" in color kit manual)

Table 9.1 Troubleshooting

Error Messages	Possible Cause	Probable Solution
CAN'T LOAD MACRO	Printer can't load a MACRO in Hex. Dump mode	Power off then on
	Some data remains in printer	Press ON LINE switch to print out remaining data
CAN'T PRINT OUT	Some data remains and printer can't output	With paper installed press ON LINE switch to print out remaining data
CAN'T SET MARGIN	Margins are set incorrectly	Set margins correctly (☞ P. 3-15—3-19)
PAPER OUT	Paper is not installed or is *not under platen*	Install paper or load paper *by pressing* LOAD/PARK switch (☞ P. 2-12—2-25)
NO COLOR RIBBON	Printer can't perform color printing with a black ribbon or without a color ribbon	Install a color ribbon (☞ Color kit manual)
NO COLOR KIT	Printer can't perform color printing without a color kit and a color ribbon	Install a color kit and a color ribbon (☞ Color kit option installation manual)
OVERLOAD	*Path of printhead is blocked*	*Power off then eliminate* the blockage Power on to resume printing
	Paper is jamming	Power off then remove the jammed paper and set paper correctly Power on to resume printing
PRINTHEAD HOT	Printhead is overheated and printer pauses until *the printhead temperature* decreases	Automatic recovery
NO REV LF/PULL	REV LF/PULL is OFF	Set REV LF/PULL to ON (☞ P. 3-32, 3-36)
CAN'T BACK PAPER	Printer can't back paper past printable area	Do not back paper past printable area

Table 9.2 Error messages (Continued)

Error Messages	Possible Cause	Probable Solution
TOP MARGIN	Printer can't back paper past top margin (only when a top margin is set)	Do not back paper past top margin or reset top margin to 0
CAN'T SET TOF	Printer can't set top of form	Check your paper installation (☞ P. 2-12—2-25)
EEPROM ERROR	EEP ROM chip is out of order	Contact a local Authorized Service
RAM ERROR	RAM chip is out of order	

Table 9.2 Error messages

Appendix A

Character Set Tables

Epson LQ-860 Italic Character Set

Dec.		0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
	Hex.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0	NUL		SP	0	@	P	`	p			SP	*0*	*@*	*P*	*`*	*p*
1	1		DC1	!	1	A	Q	a	q		DC1	*!*	*1*	*A*	*Q*	*a*	*q*
2	2		DC2	"	2	B	R	b	r		DC2	*"*	*2*	*B*	*R*	*b*	*r*
3	3		DC3	#	3	C	S	c	s		DC3	*#*	*3*	*C*	*S*	*c*	*s*
4	4		DC4	$	4	D	T	d	t		DC4	*$*	*4*	*D*	*T*	*d*	*t*
5	5			%	5	E	U	e	u			*%*	*5*	*E*	*U*	*e*	*u*
6	6			&	6	F	V	f	v			*&*	*6*	*F*	*V*	*f*	*v*
7	7	BEL		'	7	G	W	g	w	BEL		*'*	*7*	*G*	*W*	*g*	*w*
8	8	BS	CAN	(	8	H	X	h	x	BS	CAN	*(*	*8*	*H*	*X*	*h*	*x*
9	9	HT	EM	)	9	I	Y	i	y	HT	EM	*)*	*9*	*I*	*Y*	*i*	*y*
10	A	LF		*	:	J	Z	j	z	LF		***	*:*	*J*	*Z*	*j*	*z*
11	B	VT	ESC	+	;	K	[	k	{	VT	ESC	*+*	*;*	*K*	*[*	*k*	*{*
12	C	FF		,	<	L	\	l	¦	FF		*,*	*<*	*L*	**	*l*	*¦*
13	D	CR		-	=	M	]	m	}	CR		*-*	*=*	*M*	*]*	*m*	*}*
14	E	SO		.	>	N	^	n	~	SO		*.*	*>*	*N*	*^*	*n*	*~*
15	F	SI		/	?	O	_	o	DEL	SI		*/*	*?*	*O*	*_*	*o*	NUL

Appendix A

Epson LQ-860 Graphic Character Set 2

Dec.	Hex.	0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0	NUL		SP	0	@	P	`	p	Ç	É	á	▒	└	╨	α	≡
1	1		DC1	!	1	A	Q	a	q	ü	æ	í	▓	┴	╤	ß	±
2	2		DC2	"	2	B	R	b	r	é	Æ	ó	╡	┬	╥	Γ	≥
3	3		DC3	#	3	C	S	c	s	â	ô	ú	╢	├	╙	π	≤
4	4		DC4	$	4	D	T	d	t	ä	ö	ñ	╖	─	╘	Σ	⌠
5	5			%	5	E	U	e	u	à	ò	Ñ	╕	┼	╒	σ	⌡
6	6			&	6	F	V	f	v	å	û	ª	╣	╞	╓	µ	÷
7	7	BEL		'	7	G	W	g	w	ç	ù	º	╗	╟	╫	τ	≈
8	8	BS	CAN	(	8	H	X	h	x	ê	ÿ	¿	╝	╚	╪	Φ	°
9	9	HT	EM	)	9	I	Y	i	y	ë	Ö	⌐	╜	╔	┘	Θ	∙
10	A	LF		*	:	J	Z	j	z	è	Ü	¬	╛	╩	┌	Ω	·
11	B	VT	ESC	+	;	K	[	k	{	ï	¢	½	┐	╦	▐	δ	√
12	C	FF		,	<	L	\	l	|	î	£	¼	└	╠	▄	n	²
13	D	CR		-	=	M	]	m	}	ì	¥	¡	╛	═	▌	∅	■
14	E	SO		.	>	N	^	n	~	Ä	₧	«	┘	╬	▀	ε	■
15	F	SI		/	?	O	_	o	DEL	Å	ƒ	»	┐	╧	■	∩	SP

Note:

- Set 1 is the same one which 80_H–$9F_H$ is switched to 00_H–$1F_H$.

Epson LQ-860 Character Set 2 (Multilingual)

Dec.		0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
	Hex.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0	NUL		SP	0	@	P	`	p	Ç	É	á	▒	└	ð	Ó	-
1	1		DC1	!	1	A	Q	a	q	ü	æ	í	▓	┴	Ð	ß	±
2	2		DC2	"	2	B	R	b	r	é	Æ	ó	─	┬	Ê	Ô	‗
3	3		DC3	#	3	C	S	c	s	â	ô	ú	│	├	Ë	Ò	¾
4	4		DC4	$	4	D	T	d	t	ä	ö	ñ	┤	─	È	õ	¶
5	5			%	5	E	U	e	u	à	ò	Ñ	Á	┼	ı	Õ	§
6	6			&	6	F	V	f	v	å	û	ª	Â	ã	Í	µ	÷
7	7	BEL		'	7	G	W	g	w	ç	ù	º	À	Ã	Î	þ	¸
8	8	BS	CAN	(	8	H	X	h	x	ê	ÿ	¿	©	╚	Ï	Þ	°
9	9	HT	EM	)	9	I	Y	i	y	ë	Ö	®	╣	╔	┘	Ú	¨
10	A	LF		*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Û	·
11	B	VT	ESC	+	;	K	[	k	{	ï	ø	½	╗	╦	█	Ù	¹
12	C	FF		,	<	L	\	l	;	î	£	¼	╝	╠	▄	ý	³
13	D	CR		-	=	M	]	m	}	ì	Ø	¡	¢	═	¦	Ý	²
14	E	SO		.	>	N	^	n	~	Ä	×	«	¥	╬	Ì	¯	■
15	F	SI		/	?	O	_	o	DEL	Å	ƒ	»	┐	¤	▀	´	SP

Note:
Set 1 is the same one which 80H–9FH is switched to 00H–1FH.

Epson LQ-860 Character Set 2 (Portugal)

Dec.		0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
	Hex.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0	NUL		SP	0	@	P	`	p	Ç	É	á	▒	└	╨	α	≡
1	1		DC1	!	1	A	Q	a	q	ü	À	í	▓	┴	╤	ß	±
2	2		DC2	"	2	B	R	b	r	é	È	ó	╡	┬	╥	Γ	≥
3	3		DC3	#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤
4	4		DC4	$	4	D	T	d	t	ã	õ	ñ	┤	─	╘	Σ	⌠
5	5			%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
6	6			&	6	F	V	f	v	Á	Ú	ª	╢	╞	╓	µ	÷
7	7	BEL		'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
8	8	BS	CAN	(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°
9	9	HT	EM	)	9	I	Y	i	y	Ê	Ö	⌐	╣	╔	┘	Θ	∙
10	A	LF		*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
11	B	VT	ESC	+	;	K	[	k	{	ï	¢	½	╗	╦	█	δ	√
12	C	FF		,	<	L	\	l	|	Ô	£	¼	╝	▄	∞	ⁿ
13	D	CR		-	=	M	]	m	}	ì	Ù	¡	¾	╜	▌	φ	²
14	E	SO		.	>	N	^	n	~	Ä	₧	«	┐	╛	▐	ε	■
15	F	SI		/	?	O	_	o		Å	ƒ	»	┘	┴	▀	∩	SP

Note:

- Set 1 is the same one which 80H–9FH is switched to 00H–1FH.

Epson LQ-860 Character Set 2 (Canada)

Dec.		0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
	Hex.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0	NUL		SP	0	@	P	`	p	Ç	É	í	▒	└	╨	α	≡
1	1		DC1	!	1	A	Q	a	q	ü	æ	´	▓	┴	╤	ß	±
2	2		DC2	"	2	B	R	b	r	é	Æ	ó	_	┬	╥	Γ	≥
3	3		DC3	#	3	C	S	c	s	â	ô	ú	|	├	╙	π	≤
4	4		DC4	$	4	D	T	d	t	À	ë	¨	┤	─	╘	Σ	⌠
5	5			%	5	E	U	e	u	à	Ÿ	¸	╡	┼	╒	σ	⌡
6	6			&	6	F	V	f	v	¶	û	ª	╢	╞	╓	µ	÷
7	7	BEL		'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
8	8	BS	CAN	(	8	H	X	h	x	ê	¤	↑	╕	╚	╪	Φ	°
9	9	HT	EM	)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	Θ	•
10	A	LF		*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
11	B	VT	ESC	+	;	K	[	k	{	ï	¢	½	╗	╦	█	δ	√
12	C	FF		,	<	L	\	l	|	î	£	¼	╝	╠	▄	∞	ⁿ
13	D	CR		-	=	M	]	m	}	ì	¥	¡	╜	═	▌	ø	²
14	E	SO		.	>	N	^	n	~	Ä	Ø	«	╛	╬	▐	∈	■
15	F	SI		/	?	O	_	o		§	ƒ	»	┐	╧	▀	∩	SP

Note:
Set 1 is the same one which 80_H–$9F_H$ is switched to 00_H–$1F_H$.

Epson LQ-860 Character Set 2 (Norway)

Dec.		0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
	Hex.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0	NUL		SP	0	@	P	`	p	Ç	É	á	▒	└	╨	α	≡
1	1		DC1	!	1	A	Q	a	q	ü	æ	í	▓	┴	╤	ß	±
2	2		DC2	"	2	B	R	b	r	é	Æ	ó	│	┬	╥	Γ	≥
3	3		DC3	#	3	C	S	c	s	â	ô	ú	┤	├	╙	π	≤
4	4		DC4	$	4	D	T	d	t	ä	ö	ñ	╡	─	╘	Σ	⌠
5	5			%	5	E	U	e	u	à	ò	Ñ	╢	┼	╒	σ	⌡
6	6			&	6	F	V	f	v	å	û	ª	╖	╞	╓	µ	÷
7	7	BEL		'	7	G	W	g	w	ç	ù	º	╕	╟	╫	τ	≈
8	8	BS	CAN	(	8	H	X	h	x	ê	ÿ	¿	╣	╚	╪	Φ	°
9	9	HT	EM	)	9	I	Y	i	y	ë	Ö	⌐	╗	╔	┘	Θ	∙
10	A	LF		*	:	J	Z	j	z	è	Ü	¬	╝	╩	┌	Ω	·
11	B	VT	ESC	+	;	K	[	k	{	ï	ø	½	╜	╦	█	δ	√
12	C	FF		,	<	L	\	l	|	î	£	¼	╛	╠	∞	ⁿ
13	D	CR		-	=	M	]	m	}	ì	Ø	¡	╛	═	▌	φ	²
14	E	SO		.	>	N	^	n	~	Ä	×	«	╛	╬	▐	ε	■
15	F	SI		/	?	O	_	o		Å	ƒ	»	┐	╧	▀	∩	SP

Note:

- Set 1 is the same one which 80_H–$9F_H$ is switched to 00_H–$1F_H$.

IBM Proprinter X24E Character Set 2

Dec.		0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
	Hex.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0	NUL		SP	0	@	P	`	p	Ç	É	á	░	└	╨	α	≡
1	1		DC1	!	1	A	Q	a	q	ü	æ	í	▒	┴	╤	ß	±
2	2		DC2	"	2	B	R	b	r	é	Æ	ó	▓	┬	╥	Γ	≥
3	3	♥		#	3	C	S	c	s	â	ô	ú	¡	├	╙	π	≤
4	4	♦	DC4	$	4	D	T	d	t	ä	ö	ñ	┤	─	╘	Σ	⌠
5	5	♣	§	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
6	6	♠		&	6	F	V	f	v	å	û	ª	╢	╞	╓	µ	÷
7	7	BEL		'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
8	8	BS		(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°
9	9	HT		)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	Θ	∙
10	A	LF		*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
11	B	VT	ESC	+	;	K	[	k	{	ï	¢	½	╗	╦	█	δ	√
12	C	FF		,	<	L	\	l	|	î	£	¼	╝	╠	∞	ⁿ
13	D	CR		-	=	M	]	m	}	ì	¥	¡	╜	═	▌	ø	²
14	E	SO		.	>	N	^	n	~	Ä	₧	«	╛	╬	▐	ε	■
15	F	SI		/	?	O	_	o		Å	ƒ	»	┐	╧	▀	∩	SP

Note:
Set 1 is the same one which 80H–9FH is switched to 00H–1FH.

IBM Proprinter X24E All Character Chart

Dec.		0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
	Hex.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0		►	SP	0	@	P	`	p	Ç	É	á	▒	└	╨	α	≡
1	1	☺	◄	!	1	A	Q	a	q	ü	æ	í	▓	┴	╤	ß	±
2	2	☻	↕	"	2	B	R	b	r	é	Æ	ó	▓	┬	╥	Γ	≥
3	3	♥	‼	#	3	C	S	c	s	â	ô	ú	┤	├	╙	π	≤
4	4	♦	¶	$	4	D	T	d	t	ä	ö	ñ	╡	─	╘	Σ	⌠
5	5	♣	§	%	5	E	U	e	u	à	ò	Ñ	╢	┼	╒	σ	⌡
6	6	♠	▬	&	6	F	V	f	v	å	û	ª	╖	╞	╓	µ	÷
7	7	•	↨	'	7	G	W	g	w	ç	ù	º	╕	╟	╫	τ	≈
8	8	◘	↑	(	8	H	X	h	x	ê	ÿ	¿	╣	╚	╪	Φ	°
9	9	○	↓	)	9	I	Y	i	y	ë	Ö	⌐	╢	╔	┘	Θ	∙
10	A	▓	→	*	:	J	Z	j	z	è	Ü	¬	▌	╩	┌	Ω	·
11	B	♂	←	+	;	K	[	k	{	ï	¢	½	╗	╦	▓	δ	√
12	C	♀	∟	,	<	L	\	l	|	î	£	¼	╝	▄	∞	ⁿ
13	D	♪	↔	-	=	M	]	m	}	ì	¥	¡	╜	▌	▄	ø	²
14	E	♫	▲	.	>	N	^	n	~	Ä	₧	«	╛	╬	▌	ε	■
15	F	☼	▼	/	?	O	_	o	⌂	Å	ƒ	»	┐	╧	▀	∩	SP

IBM Proprinter X 24E Character Set 2 (Multilingual)

Dec.		0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
	Hex.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0	NUL		SP	0	@	P	`	p	Ç	É	á	▒	└	ð	Ó	-
1	1		DC1	!	1	A	Q	a	q	ü	æ	í	▓	┴	Ð	ß	±
2	2		DC2	"	2	B	R	b	r	é	Æ	ó	█	┬	Ê	Ô	‗
3	3	♥		#	3	C	S	c	s	â	ô	ú	|	├	Ë	Ò	¾
4	4	♦	DC4	$	4	D	T	d	t	ä	ö	ñ	┤	─	È	õ	¶
5	5	♣	§	%	5	E	U	e	u	à	ò	Ñ	Á	┼	ı	Õ	§
6	6	♠		&	6	F	V	f	v	å	û	ª	Â	ã	Í	µ	÷
7	7	BEL		'	7	G	W	g	w	ç	ù	º	À	Ã	Î	þ	¸
8	8	BS	CAN	(	8	H	X	h	x	ê	ÿ	¿	©	╚	Ï	Þ	°
9	9	HT		)	9	I	Y	i	y	ë	Ö	®	╣	╔	┘	Ú	¨
10	A	LF		*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Û	·
11	B	VT	ESC	+	;	K	[	k	{	ï	ø	½	╗	╦	█	Ù	¹
12	C	FF		,	<	L	\	l	|	î	£	¼	╝	▐	▄	ý	³
13	D	CR		-	=	M	]	m	}	ì	Ø	¡	¢	═	|	Ý	²
14	E	SO		.	>	N	^	n	~	Ä	×	«	¥	╬	Ì	¯	▪
15	F	SI		/	?	O	_	o		Å	ƒ	»	┐	¤	▀	´	SP

Note:

Set 1 is the same one which 03_H–06_H and 15_H is switched to NUL, and 80_H–$9F_H$ is switched to 00_H–$1F_H$.

IBM Proprinter X24E All Character Chart (Multilingual)

Dec.	Hex.	0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0	▯	▸	SP	0	@	P	`	p	Ç	É	á	▒	└	ð	Ó	-
1	1	☺	◂	!	1	A	Q	a	q	ü	æ	í	▓	┴	Ð	ß	±
2	2	☻	↕	"	2	B	R	b	r	é	Æ	ó	▓	┬	Ê	Ô	_
3	3	♥	‼	#	3	C	S	c	s	â	ô	ú	|	├	Ë	Ò	¾
4	4	♦	¶	$	4	D	T	d	t	ä	ö	ñ	┤	—	È	õ	¶
5	5	♣	§	%	5	E	U	e	u	à	ò	Ñ	Á	+	ı	Õ	§
6	6	♠	_	&	6	F	V	f	v	å	û	ª	Â	ã	Í	µ	÷
7	7	•	↨	'	7	G	W	g	w	ç	ù	º	À	Ã	Î	þ	¸
8	8	◘	↑	(	8	H	X	h	x	ê	ÿ	¿	©	╚	Ï	Þ	°
9	9	○	↓	)	9	I	Y	i	y	ë	Ö	®	╣	╔	┘	Ú	¨
10	A	◙	→	*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Û	·
11	B	♂	←	+	;	K	[	k	{	ï	¢	½	╗	╦	█	Ù	¹
12	C	♀	∟	,	<	L	\	l	|	î	£	¼	╝	▄	ý	³
13	D	♪	↔	-	=	M	]	m	}	ì	Ø	¡	¢	═	¦	Ý	²
14	E	♫	▲	.	>	N	^	n	~	Ä	×	«	¥	╬	Ì	¯	■
15	F	☼	▼	/	?	O	_	o	⌂	Å	ƒ	»	┐	¤	▀	´	SP

IBM Proprinter X24E Character Set 2 (Portugal)

Dec.		0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
	Hex.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0	NUL		SP	0	@	P	`	p	Ç	É	á	▒	└	╨	α	≡
1	1		DC1	!	1	A	Q	a	q	ü	À	í	▓	┴	╤	ß	±
2	2		DC2	"	2	B	R	b	r	é	È	ó	▓	┬	╥	Γ	≥
3	3	♥		#	3	C	S	c	s	â	ô	ú	|	├	╙	π	≤
4	4	♦	DC4	$	4	D	T	d	t	ã	õ	ñ	┤	─	╘	Σ	⌠
5	5	♣	§	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
6	6	♠		&	6	F	V	f	v	Á	Ú	ª	╢	╞	╓	µ	÷
7	7	BEL		'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
8	8	BS		(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°
9	9	HT		)	9	I	Y	i	y	Ê	Ö	⌐	╣	╔	┘	Θ	∙
10	A	LF		*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
11	B	VT	ESC	+	;	K	[	k	{	í	¢	½	╗	╦	█	δ	√
12	C	FF		,	<	L	\	l	|	Ô	£	¼	╝	╠	▄	∞	ⁿ
13	D	CR		-	=	M	]	m	}	ì	Ø	¡	╜	═	▌	ø	²
14	E	SO		.	>	N	^	n	~	Ã	₧	«	╛	╬	▐	ε	■
15	F	SI		/	?	O	_	o		Â	ƒ	»	┐	╧	▀	∩	SP

Note:
Set 1 is the same one which 03_H–06_H and 15_H is switched to NUL, and 80_H–$9F_H$ is switched to 00_H–$1F_H$.

IBM Proprinter X24E All Character (Portugal)

Dec.	Hex.	0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0	∅	►	SP	0	@	P	`	p	Ç	É	á	▒	└	⊥	α	≡
1	1	☺	◄	!	1	A	Q	a	q	ü	æ	í	▓	┴	╤	ß	±
2	2	☻	↕	"	2	B	R	b	r	é	Æ	ó	▓	┬	╥	Γ	≥
3	3	♥	‼	#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤
4	4	♦	¶	$	4	D	T	d	t	ä	ö	ñ	┤	─	╘	Σ	⌠
5	5	♣	§	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
6	6	♠	_	&	6	F	V	f	v	Å	û	ª	╢	╞	╓	µ	÷
7	7	•	↨	'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
8	8	◘	↑	(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°
9	9	○	↓	)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	Θ	·
10	A	◙	→	*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
11	B	♂	←	+	;	K	[	k	{	ï	¢	½	╗	╦	█	δ	√
12	C	♀	∟	,	<	L	\	l	¦	Ô	£	¼	╝	╠	▄	∞	ⁿ
13	D	♪	↔	-	=	M	]	m	}	ì	Ù	¡	╜	═	▌	φ	²
14	E	♫	▲	.	>	N	^	n	~	Ä	₧	«	╛	╬	▐	ε	■
15	F	☼	▼	/	?	O	_	o	⌂	Á	ƒ	»	┐	╧	▀	∩	SP

IBM Proprinter X24E Character Set 2 (Canada)

Dec.		0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
	Hex.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0	NUL		SP	0	@	P	`	p	Ç	É	|	▒	└	⊥	α	≡
1	1		DC1	!	1	A	Q	a	q	ü	È	´	▓	┴	┬	ß	±
2	2		DC2	"	2	B	R	b	r	é	Ê	ó	▉	┬	┬	Γ	≥
3	3	♥		#	3	C	S	c	s	â	ô	ú	┤	├	╚	π	≤
4	4	♦	DC4	$	4	D	T	d	t	À	Ë	¨	┤	─	╔	Σ	⌠
5	5	♣	§	%	5	E	U	e	u	à	Ï	¸	┤	┼	┌	σ	⌡
6	6	♠		&	6	F	V	f	v	¶	û	³	╡	├	┌	µ	÷
7	7	BEL		'	7	G	W	g	w	ç	ù	¯	╖	╞	╫	τ	≈
8	8	BS		(	8	H	X	h	x	ê	¤	¹	╕	╚	╪	Φ	°
9	9	HT		)	9	I	Y	i	y	ë	Ô	⌐	╣	┌	┘	Θ	•
10	A	LF		*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
11	B	VT	ESC	+	;	K	[	k	{	ï	¢	½	╖	╥	▌	δ	√
12	C	FF		,	<	L	\	l	|	î	£	¼	╜	╞	▬	∞	ⁿ
13	D	CR		-	=	M	]	m	}	_	Ù	¾	╛	═	▐	ø	²
14	E	SO		.	>	N	^	n	~	Â	Ù	«	╜	╬	▐	ε	■
15	F	SI		/	?	O	_	o		§	ƒ	»	╖	╧	▀	∩	SP

Note:

Set 1 is the same one which 03_H–06_H and 15_H is switched to "NUL" and 80_H–$9F_H$ is switched to 00_H–$1F_H$.

IBM Proprinter X24E All Character (Canada)

Dec.		0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
	Hex.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0		►	SP	0	@	P	`	p	Ç	É	á	░	└	╨	α	≡
1	1	☺	◄	!	1	A	Q	a	q	ü	æ	í	▒	┴	╤	ß	±
2	2	☻	↕	"	2	B	R	b	r	é	Æ	ó	▓	┬	╥	Γ	≥
3	3	♥	‼	#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤
4	4	♦	¶	$	4	D	T	d	t	À	ö	ñ	┤	─	╘	Σ	⌠
5	5	♣	§	%	5	E	U	e	u	à	Ÿ	Ñ	╡	┼	╒	σ	⌡
6	6	♠	▬	&	6	F	V	f	v	¶	Ü	ª	╢	╞	╓	µ	÷
7	7	•	↨	'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
8	8	◘	↑	(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°
9	9	○	↓	)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	Θ	∙
10	A	◙	→	*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
11	B	♂	←	+	;	K	[	k	{	ï	¢	½	╗	╦	█	δ	√
12	C	♀	∟	,	<	L	\	l	|	î	£	¼	╠	▄	∞	ⁿ
13	D	♪	↔	-	=	M	]	m	}	_	Ù	¥	¡	═	▌	ϕ	²
14	E	♫	▲	.	>	N	^	n	~	Ä	Û	«	╜	╬	▐	ε	■
15	F	☼	▼	/	?	O	_	o	⌂	Å	ƒ	»	╛	╧	▀	∩	SP

IBM Proprinter X24E Character Set 2 (Norway)

Dec.		0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
	Hex.	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0	NUL		SP	0	@	P	`	p	Ç	É	á	▒	└	╨	α	≡
1	1		DC1	!	1	A	Q	a	q	ü	æ	í	▓	┴	╤	ß	±
2	2		DC2	"	2	B	R	b	r	é	Æ	ó	▓	┬	╥	Γ	≥
3	3	♥		#	3	C	S	c	s	â	ô	ú	|	├	╙	π	≤
4	4	♦	DC4	$	4	D	T	d	t	ä	õ	ñ	┤	─	╘	Σ	⌠
5	5	♣	§	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
6	6	♠		&	6	F	V	f	v	å	û	ª	╢	╞	╓	µ	÷
7	7	BEL		'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
8	8	BS		(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°
9	9	HT		)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	Θ	∙
10	A	LF		*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
11	B	VT	ESC	+	;	K	[	k	{	ï	ø	½	╗	╦	█	δ	√
12	C	FF		,	<	L	\	l	|	î	£	¼	╝	╠	▄	∞	ⁿ
13	D	CR		-	=	M	]	m	}	ì	Ø	¡	╜	═	▌	φ	²
14	E	SO		.	>	N	^	n	~	Ä	×ₙ	«	╛	╬	▐	ε	■
15	F	SI		/	?	O	_	o		Å	ƒ	»	╖	╧	▀	∩	SP

Note:
Set 1 is the same one which 03_H–06_H and 15_H is switched to NUL and 80_H–$9F_H$ is switched to 00_H–$1F_H$.

IBM Proprinter X24E All Character (Norway)

Dec.	Hex.	0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0	▯	►	SP	0	@	P	`	p	Ç	É	á	▒	└	╨	α	≡
1	1	☺	◄	!	1	A	Q	a	q	ü	æ	í	▓	┴	╤	ß	±
2	2	☻	↕	"	2	B	R	b	r	é	Æ	ó	▓	┬	╥	Γ	≥
3	3	♥	‼	#	3	C	S	c	s	â	ô	ú	▏	├	╙	π	≤
4	4	♦	¶	$	4	D	T	d	t	ä	ö	ñ	┤	─	╘	Σ	⌠
5	5	♣	§	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
6	6	♠	▬	&	6	F	V	f	v	å	û	ª	╢	╞	╓	µ	÷
7	7	•	↨	'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
8	8	◘	↑	(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°
9	9	○	↓	)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	Θ	∙
10	A	◙	→	*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
11	B	♂	←	+	;	K	[	k	{	ï	ø	½	╗	╦	█	δ	√
12	C	♀	∟	,	<	L	\	l	¦	î	£	¼	╜	╠	▄	∞	ⁿ
13	D	♪	↔	-	=	M	]	m	}	ì	Ø	¡	╛	═	▌	φ	²
14	E	♫	▲	.	>	N	^	n	~	Ä	×	«	╘	╬	▐	ε	■
15	F	☼	▼	/	?	O	_	o	⌂	Å	ƒ	»	╒	╧	▀	∩	DEL

International Character Set

	n	35D 23H	36D 24H	64D 40H	91D 5BH	92D 5CH	93D 5DH	94D 5EH	96D 60H	123D 7BH	124D 7CH	125D 7DH	126D 7EH	155D 9BH	157D 9DH
USA	0	#	$	@	[	\	]	^	`	{	¦	}	~	¢	¥
FRANCE	1	#	$	à	°	ç	§	^	`	é	ù	è	¨	¢	¥
GERMANY	2	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß	¢	¥
ENGLAND	3	£	$	@	[	\	]	^	`	{	¦	}	~	¢	¥
DENMARK1	4	#	$	@	Æ	ø	Å	^	`	æ	ø	å	~	ø	Ø
SWEDEN	5	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü	¢	¥
ITALY	6	#	$	@	°	\	é	^	ù	à	ò	è	ì	¢	¥
SPAIN1	7	₧	$	@	¡	Ñ	¿	^	`	¨	ñ	}	~	¢	¥
JAPAN	8	#	$	@	[	¥	]	^	`	{	¦	}	~	¢	¥
NORWAY	9	#	¤	É	Æ	ø	Å	Ü	é	æ	ø	å	ü	ø	Ø
DENMARK2	10	#	$	É	Æ	ø	Å	Ü	é	æ	ø	å	ü	ø	Ø
SPAIN2	11	#	$	á	¡	Ñ	¿	é	`	í	ñ	ó	ú	ç	¥
LATIN AMERICA	12	#	$	á	¡	Ñ	¿	é	ü	í	ñ	ó	ú	ç	¥
KOREA	13	#	$	@	[	₩	]	^	`	{	¦	}	~	¢	¥
LEGAL	64	#	$	§	°	´	¨	¶	`	©	®	†	™	¢	¥

*1 *2

Note:

*1 These characters can be changed only in the Epson LQ-860 mode. In the IBM Proprinter X24E mode, International Character Set is set to USA and it can not be changed.

*2 These characters are effective in both Graphic Character Set 2 of the Epson LQ-860 and IBM Proprinter X24E modes.

Appendix B

Proportional Spacing Tables

ASCII Characters

Epson LQ-860 Mode Characters

ASCII code	Char.	Width	
		Normal	Script
0	à	30	20
1	è	30	20
2	ù	36	24
3	ò	30	20
4	ì	18	12
5	'	24	16
6	£	30	20
7	¡	30	20
8	¿	30	20
9	Ñ	36	24
10	ñ	36	24
11	Ñ	30	20
12	Pt	42	28
13	Å	36	24
14	å	30	20
15	Ç	30	20
16	$	30	20
17	ß	36	24
18	Æ	42	28
19	æ	42	28
20	Ø	36	24
21	ø	30	20
22	¨	30	20
23	Å	36	24
24	Ö	36	24
25	Ü	42	28
26	ä	30	20
27	ö	30	20
28	ü	36	24
29	É	36	24
30	é	30	20
31	¥	36	24
32	SPACE	30	20
33	!	18	12
34	"	30	20
35	#	30	20
36	$	30	20
37	%	36	24
38	&	36	24
39	'	18	12
40	(	24	16
41	)	24	16
42	*	30	20
43	+	30	20
44	,	18	12
45	-	30	20
46	.	18	12
47	/	30	20
48	0	30	20
49	1	30	20
50	2	30	20
51	3	30	20
52	4	30	20
53	5	30	20
54	6	30	20
55	7	30	20
56	8	30	20
57	9	30	20
58	:	18	12
59	;	18	12
60	<	30	20
61	=	30	20
62	>	30	20
63	?	30	20
64	@	36	24
65	A	36	24
66	B	36	24
67	C	36	24
68	D	36	24
69	E	36	24
70	F	36	24
71	G	36	24
72	H	36	24
73	I	24	16
74	J	30	20
75	K	36	24
76	L	36	24
77	M	42	28
78	N	36	24
79	O	36	24
80	P	36	24
81	Q	36	24
82	R	36	24
83	S	36	24
84	T	36	24
85	U	42	28
86	V	36	24
87	W	42	28
88	X	36	24
89	Y	36	24
90	Z	30	20
91	[	24	16
92	\	30	20
93	]	24	16
94	^	30	20
95	_	30	20
96	`	18	12
97	a	30	20
98	b	36	24
99	c	30	20
100	d	36	24
101	e	30	20
102	f	24	16
103	g	36	24
104	h	36	24
105	i	18	12
106	j	24	16
107	k	36	24
108	l	18	12
109	m	42	28
110	n	36	24
111	o	30	20
112	p	36	24
113	q	36	24
114	r	30	20
115	s	30	20
116	t	24	16
117	u	36	24
118	v	36	24
119	w	42	28
120	x	30	20
121	y	36	24
122	z	30	20
123	{	24	16
124	|	18	12
125	}	24	16
126	~	30	20
127	ß	30	20

Compressed PS width is ½ of Normal PS.

Unit: 1/360 inch (0.07 mm)

IBM Proprinter X24E Mode Characters

ASCII code	Char.	Width	
		Normal	Script
32	SPACE	30	
33	!	30	
34	"	30	
35	#	30	
36	$	30	
37	%	30	
38	&	36	
39	'	18	
40	(	30	
41	)	30	
42	*	30	
43	+	30	
44	,	30	
45	-	30	
46	.	30	
47	/	30	
48	0	30	
49	1	30	
50	2	30	
51	3	30	
52	4	30	
53	5	30	
54	6	30	
55	7	30	
56	8	30	
57	9	30	
58	:	30	
59	;	30	
60	<	30	
61	=	30	
62	>	30	
63	?	30	
64	@	30	
65	A	42	
66	B	42	
67	C	42	
68	D	42	
69	E	36	
70	F	36	
71	G	42	
72	H	42	
73	I	24	
74	J	30	
75	K	42	

ASCII code	Char.	Width	
		Normal	Script
76	L	36	
77	M	42	
78	N	42	
79	O	42	
80	P	36	
81	Q	42	
82	R	42	
83	S	36	
84	T	42	
85	U	42	
86	V	42	
87	W	42	
88	X	42	
89	Y	42	
90	Z	36	
91	[	30	
92	\	30	
93	]	30	
94	^	30	
95	_	30	
96	`	30	
97	a	30	
98	b	36	
99	c	30	
100	d	36	
101	e	30	
102	f	24	
103	g	36	
104	h	36	
105	i	18	
106	j	18	
107	k	36	
108	l	18	
109	m	42	
110	n	36	
111	o	30	
112	p	36	
113	q	36	
114	r	30	
115	s	30	
116	t	24	
117	u	36	
118	v	36	
119	w	42	

ASCII code	Char.	Width	
		Normal	Script
120	x	36	
121	y	36	
122	z	30	
123	{	30	
124	|	30	
125	}	30	
126	~	30	

Compressed PS width is ½ of Normal PS.

Unit: 1/360 inch (0.07 mm)

Appendix B

Special Characters

Epson LQ-860 Mode Characters

Decimal code	Char.	Width Normal	Width Script
21	§	30	20
36	¤	30	20
48	0	30	20
91	'	24	16
92	Ø	36	24
92	`	36	24
92	₩	42	28
93	"	36	24
123	◐	36	24
124	¶	30	20
125	+	36	24
126	¨	30	20
126	‾	36	24
128	Ç	36	24
129	ü	36	24
130	é	30	20
131	â	30	20
132	ä	30	20
133	à	30	20
134	å	30	20
135	ç	30	20
136	ê	30	20
137	ë	30	20
138	è	30	20
139	ï	18	12
140	î	18	12
141	ì	18	12
142	Ä	36	24
143	Å	36	24
144	É	36	24
145	æ	42	28
146	Æ	42	28
147	ô	30	20
148	ö	30	20
149	ò	30	20
150	û	36	24
151	ù	36	24
152	ÿ	36	24
153	Ö	36	24
154	Ü	42	28
155	¢	30	20
156	£	30	20
157	¥	36	24
158	₧	42	28
159	ƒ	30	20
160	á	30	20
161	í	18	12
162	ó	30	20
163	ú	36	24
164	ñ	36	24
165	Ñ	36	24
166	ª	30	20
167	º	30	20
168	¿	30	20
169	⌐	30	20
170	¬	30	20
171	½	30	20
172	¼	30	20
173	¡	30	20
174	«	30	20
175	»	30	20
224	α	30	20
225	ß	30	20
226	Γ	30	20
227	π	30	20
228	Σ	30	20
229	σ	30	20
230	µ	30	20
231	τ	30	20
232	Φ	30	20
233	Θ	30	20
234	Ω	30	20
235	δ	30	20
236	∞	30	20
237	ϕ	30	20
238	ε	30	20
239	∩	30	20
240	≡	30	20
241	±	30	20
242	≥	30	20
243	≤	30	20
246	÷	30	20
247	≈	30	20
248	°	30	20
249	∙	30	20
250	·	30	20
251	√	30	20
252	ⁿ	30	20
253	²	30	20
254	■	30	20
255	SP	30	20

Compressed PS width is ½ of Normal PS.

Unit: 1/360 inch (0.07 mm)

Epson LQ-860 Mode Characters (Multilingual)

ASCII code	Char.	Width	
		Normal	Script
35	#	42	28
48	0	30	20
92	¥	42	28
93	]	36	24
125	}	36	24
126	‾	36	24
128	Ç	36	24
129	ü	36	24
130	é	30	20
131	â	30	20
132	ä	30	20
133	à	30	20
134	å	30	20
135	ç	30	20
136	ê	30	20
137	ë	30	20
138	è	30	20
139	ï	18	12
140	î	18	12
141	ì	18	12
142	Ä	36	24
143	Å	36	24
144	É	36	24
145	æ	42	28
146	Æ	42	28
147	ô	30	20
148	ö	30	20
149	ò	30	20
150	û	36	24
151	ù	36	24
152	ÿ	36	24
153	Ö	36	24
154	Ü	42	28
155	ø	30	20
156	£	30	20
157	Ø	36	24
158	×	30	20
159	ƒ	30	20
160	á	30	20
161	í	18	12
162	ó	30	20
163	ú	36	24
164	ñ	36	24
165	Ñ	36	24

ASCII code	Char.	Width	
		Normal	Script
166	ª	30	20
167	º	30	20
168	¿	30	20
169	⌐	36	24
170	¬	30	20
171	½	30	20
172	¼	30	20
173	¡	30	20
174	«	30	20
175	»	30	20
181	Á	36	24
182	Â	36	24
183	À	36	24
184	©	36	24
189	¢	30	20
190	¥	36	24
198	ã	30	20
199	Ã	36	24
207	¤	30	20
208	ð	36	24
209	Ð	36	24
210	Ê	36	24
211	Ë	36	24
212	È	36	24
213	ı	18	12
214	Í	24	16
215	Î	24	16
216	Ï	24	16
221	¦	18	12
222	Ì	24	16
224	Ó	36	24
225	ß	36	24
226	Ô	36	24
227	Ò	36	24
228	õ	30	20
229	Õ	36	24
230	µ	30	20
231	þ	36	24
232	Þ	36	24
233	Û	42	28
234	Ù	42	28
235	ý	42	28
236	Ý	36	24
237	¯	36	24

ASCII code	Char.	Width	
		Normal	Script
238	´	30	20
239	˙	18	12
240	‗	30	20
241	±	30	20
242	‗	30	20
243	¾	30	20
244	¶	30	20
245	§	30	20
246	÷	30	20
247	¸	18	12
248	°	30	20
249	¨	30	20
250	·	30	20
251	¹	24	16
252	³	24	16
253	²	30	20
254	■	30	20
255	SP	30	20

Compressed PS width is ½ of Normal PS.

Unit: 1/360 inch (0.07 mm)

Epson LQ-860 Mode Characters (Portugal)

ASCII code	Char.	Width Normal	Width Script
21	§	30	20
36	¤	30	20
48	º	30	20
91	ª	24	16
91	Æ	42	28
91	Ä	36	24
92	¥	36	24
92	Ö	36	24
92	Ø	36	24
92	ª	36	24
92	Ü	42	28
93	Å	36	24
93	"	36	24
123	®	36	24
123	ä	30	20
123	æ	42	28
124	ö	30	20
124	ø	30	20
125	å	30	20
125	+	36	24
126	¨	30	20
126	¤	36	24
128	Ç	36	24
129	ü	36	24
130	é	30	20
131	â	30	20
132	ä	30	20
133	à	30	20
134	Å	36	24
135	ç	30	20
136	ê	30	20
137	£	36	24
138	è	30	20
139	ï	24	16
140	Ô	36	24
141	ì	18	12
142	Ä	36	24
143	Å	36	24
144	É	36	24
145	À	36	24
146	È	36	24
147	ô	30	20
148	ö	30	20
149	ò	30	20

ASCII code	Char.	Width Normal	Width Script
150	û	42	28
151	ù	36	24
152	ÿ	24	16
153	Ö	36	24
154	Ü	42	28
155	ç	30	20
156	£	30	20
157	Ø	42	28
158	₧	42	28
159	ƒ	36	24
160	á	30	20
161	í	18	12
162	ó	30	20
163	ú	36	24
164	ñ	36	24
165	Ñ	36	24
166	ª	30	20
167	º	30	20
168	¿	30	20
169	⌐	30	20
170	¬	30	20
171	½	30	20
172	¼	30	20
173	¡	30	20
174	«	30	20
175	»	30	20
224	α	30	20
225	ß	30	20
226	Γ	30	20
227	π	30	20
228	Σ	30	20
229	σ	30	20
230	µ	30	20
231	τ	30	20
232	Φ	30	20
233	Θ	30	20
234	Ω	30	20
235	δ	30	20
236	∞	30	20
237	ø	30	20
238	ε	30	20
239	∩	30	20
240	≡	30	20
241	±	30	20

ASCII code	Char.	Width Normal	Width Script
242	≥	30	20
243	≤	30	20
246	÷	30	20
247	≈	30	20
248	°	30	20
249	∙	30	20
250	·	30	20
251	√	30	20
252	ⁿ	30	20
253	²	30	20
254	■	30	20
255	BP	30	20

Compressed PS width is ½ of Normal PS.

Unit: 1/360 inch (0.07 mm)

Epson LQ-860 Mode Characters (Canada)

ASCII code	Char.	Width	
		Normal	Script
35	₧	42	28
48	0	30	20
64	á	30	20
91	·	24	16
91	Ä	36	24
91	Æ	42	28
91	¡	18	12
92	Ö	36	24
92	Ñ	36	24
92	Ø	36	24
92	`	36	24
92	₩	42	28
93	Å	36	24
93	¿	30	20
93	"	36	24
123	⌐	36	24
123	ä	30	20
123	æ	42	28
123	í	18	12
124	ö	30	20
124	ò	30	20
124	ñ	36	24
124	ø	30	20
125	+	36	24
126	™	36	24
128	Ç	36	24
129	ü	36	24
130	é	30	20
131	â	30	20
132	Ä	36	24
133	à	30	20
134	¶	30	20
135	ç	30	20
136	ê	30	20
137	ë	30	20
138	è	30	20
139	ï	18	12
140	î	18	12
141	_	30	20
142	Ä	36	24
143	§	30	20
144	É	36	24
145	È	36	24
146	Ê	36	24

ASCII code	Char.	Width	
		Normal	Script
147	ô	30	20
148	Ë	36	24
149	Ï	24	16
150	û	36	24
151	ù	36	24
152	¤	30	20
153	Ô	36	24
154	Ü	42	28
155	¢	30	20
156	£	30	20
157	Ù	42	28
158	Û	42	28
159	ƒ	30	20
160	¦	18	12
161	´	18	12
162	ó	30	20
163	ú	36	24
164	¨	30	20
165	¸	18	12
166	ª	24	16
167	⁻	30	20
168	¹	24	16
169	⌐	30	20
170	¬	30	20
171	½	30	20
172	¼	30	20
173	¡	30	20
174	«	30	20
175	»	30	20
224	α	30	20
225	ß	30	20
226	Γ	30	20
227	π	30	20
228	Σ	30	20
229	σ	30	20
230	µ	30	20
231	τ	30	20
232	Φ	30	20
233	Θ	30	20
234	Ω	30	20
235	δ	30	20
236	∞	30	20
237	ø	30	20
238	∈	30	20

ASCII code	Char.	Width	
		Normal	Script
239	∩	30	20
240	≡	30	20
241	±	30	20
242	≥	30	20
243	≤	30	20
246	÷	30	20
247	≈	30	20
248	°	30	20
249	•	30	20
250	·	30	20
251	√	30	20
252	ⁿ	30	20
253	²	30	20
254	■	30	20
255	SP	30	20

Compressed PS width is ½ of Normal PS.

Unit: 1/360 inch (0.07 mm)

Epson LQ-860 Mode Characters (Norway)

ASCII code	Char.	Width Normal	Width Script
21	§	30	20
48	0	30	20
91	Æ	24	16
92	Ø	36	24
92	'	36	24
92	Å	42	28
93	"	36	24
123	æ	36	24
125	ø	36	24
126	¨	30	20
126	å	36	24
128	Ç	36	24
129	ü	36	24
130	é	30	20
131	â	30	20
132	ä	30	20
133	à	30	20
134	Å	30	20
135	ç	30	20
136	ê	30	20
137	ë	30	20
138	è	30	20
139	ï	18	12
140	î	18	12
141	ì	18	12
142	Ä	36	24
143	Å	36	24
144	É	36	24
145	æ	42	28
146	Æ	42	28
147	ô	30	20
148	ö	30	20
149	ò	30	20
150	û	36	24
151	ù	36	24
152	ÿ	36	24
153	Ö	36	24
154	Ü	42	28
155	ø	30	20
156	£	30	20
157	Ø	36	24
158	Pt	42	28
159	ƒ	30	20
160	á	30	20

ASCII code	Char.	Width Normal	Width Script
161	í	18	12
162	ó	30	20
163	ú	36	24
164	ñ	36	24
165	Ñ	36	24
166	ª	30	20
167	º	30	20
168	¿	30	20
169	⌐	30	20
170	¬	30	20
171	½	30	20
172	¼	30	20
173	¡	30	20
174	«	30	20
175	»	30	20
224	α	30	20
225	ß	30	20
226	Γ	30	20
227	π	30	20
228	Σ	30	20
229	σ	30	20
230	µ	30	20
231	τ	30	20
232	Φ	30	20
233	Θ	30	20
234	Ω	30	20
235	δ	30	20
236	∞	30	20
237	ø	30	20
238	∈	30	20
239	∩	30	20
240	≡	30	20
241	±	30	20
242	≥	30	20
243	≤	30	20
246	÷	30	20
247	≈	30	20
248	°	30	20
249	•	30	20
250	·	30	20

ASCII code	Char.	Width Normal	Width Script
251	√	30	20
252	ⁿ	30	20
253	²	30	20
254	■	30	20
255	SP	30	20

Compressed PS width is ½ of Normal PS.

Unit: 1/360 inch (0.07 mm)

IBM Proprinter X24E Mode Characters

ASCII code	Char.	Width Normal	Width Script
0	∅	30	
1	☺	30	
2	☻	30	
3	♥	30	
4	♦	30	
5	♣	30	
6	♠	30	
7	•	30	
8	◘	30	
9	○	30	
10	◙	30	
11	♂	30	
12	♀	30	
13	♪	30	
14	♫	30	
15	☼	30	
16	►	30	
17	◄	30	
18	↕	30	
19	‼	30	
20	¶	30	
21	§	30	
22	▬	30	
23	↨	30	
24	↑	30	
25	↓	30	
26	→	30	
27	←	30	
28	∟	30	
29	↔	30	
30	▲	30	
31	▼	30	
127	⌂	30	
128	Ç	42	
129	ü	36	
130	é	30	
131	â	30	
132	ä	30	
133	à	30	
134	å	30	
135	ç	30	
136	ê	30	
137	ë	30	
138	è	30	

ASCII code	Char.	Width Normal	Width Script
139	ï	18	
140	î	18	
141	ì	18	
142	Ä	42	
143	Å	42	
144	É	36	
145	æ	42	
146	Æ	42	
147	ô	30	
148	ö	30	
149	ò	30	
150	û	36	
151	ù	36	
152	ÿ	36	
153	Ö	42	
154	Ü	42	
155	¢	30	
156	£	30	
157	¥	30	
158	₧	42	
159	ƒ	30	
160	á	30	
161	í	18	
162	ó	30	
163	ú	36	
164	ñ	36	
165	Ñ	42	
166	ª	30	
167	º	30	
168	¿	30	
169	⌐	30	
170	¬	30	
171	½	30	
172	¼	30	
173	¡	30	
174	«	42	
175	»	42	
224	α	30	
225	ß	36	
226	Γ	36	
227	π	36	
228	Σ	42	
229	σ	36	
230	µ	36	

ASCII code	Char.	Width Normal	Width Script
231	τ	30	
232	Φ	42	
233	Θ	42	
234	Ω	42	
235	δ	30	
236	∞	30	
237	ø	42	
238	ε	30	
239	∩	30	
240	≡	30	
241	±	30	
242	≥	30	
243	≤	30	
246	÷	30	
247	≈	30	
248	°	30	
249	•	30	
250	·	30	
251	√	30	
252	ⁿ	30	
253	²	30	
254	■	30	
255	SP	30	

Compressed PS width is ½ of Normal PS.

Unit: 1⁄360 inch (0.07 mm)

IBM Proprinter X24E Mode Characters (Multilingual)

ASCII code	Char.	Width Normal	Width Script
0		30	
1	☺	30	
2	☻	30	
3	♥	30	
4	♦	30	
5	♣	30	
6	♠	30	
7	•	30	
8	◘	30	
9	○	30	
10	◙	30	
11	♂	30	
12	♀	30	
13	♪	30	
14	♫	30	
15	☼	30	
16	►	30	
17	◄	30	
18	↕	30	
19	‼	30	
20	¶	30	
21	§	30	
22	▬	30	
23	↨	30	
24	↑	30	
25	↓	30	
26	→	30	
27	←	30	
28	∟	30	
29	↔	30	
30	▲	30	
31	▼	30	
127	⌂	30	
128	Ç	42	
129	ü	36	
130	é	30	
131	â	30	
132	ä	30	
133	à	30	
134	å	30	
135	ç	30	
136	ê	30	
137	ë	30	
138	è	30	
139	ï	18	
140	î	18	

ASCII code	Char.	Width Normal	Width Script
141	ì	18	
142	Ä	42	
143	Å	42	
144	É	36	
145	æ	42	
146	Æ	42	
147	ô	30	
148	ö	30	
149	ò	30	
150	û	36	
151	ù	36	
152	ÿ	36	
153	Ö	42	
154	Ü	42	
155	ø	30	
156	£	30	
157	Ø	42	
158	×	30	
159	ƒ	30	
160	á	30	
161	í	18	
162	ó	30	
163	ú	36	
164	ñ	36	
165	Ñ	42	
166	ª	30	
167	º	30	
168	¿	30	
169	®	30	
170	¬	30	
171	½	30	
172	¼	30	
173	¡	30	
174	«	42	
175	»	42	
181	Á	42	
182	Â	42	
183	À	42	
184	©	30	
189	ç	30	
190	¥	30	
198	ã	30	
199	Ã	42	
207	¤	30	
208	ð	36	

ASCII code	Char.	Width Normal	Width Script
209	Ð	42	
210	Ê	36	
211	Ë	36	
212	È	36	
213	ı	18	
214	Í	24	
215	Î	24	
216	Ï	24	
221	¦	30	
222	Ì	24	
224	Ó	42	
225	ß	36	
226	Ô	42	
227	Ò	42	
228	õ	30	
229	Õ	42	
230	µ	30	
231	þ	36	
232	Þ	42	
233	Ú	42	
234	Û	42	
235	Ù	42	
236	ý	36	
237	Ý	42	
238	¯	30	
239	´	30	
240	-	30	
241	±	30	
242	‗	30	
243	¾	30	
244	¶	30	
245	§	30	
246	÷	30	
247	¸	30	
248	°	30	
249	¨	30	
250	·	30	
251	¹	30	
252	³	30	
253	²	30	
254	■	30	
255	BP	30	

Compressed PS width is ½ of Normal PS.

Unit: 1/360 inch (0.07 mm)

IBM Proprinter X24E Mode Characters (Portugal)

ASCII code	Char.	Width	
		Normal	Script
0	Ø	30	
1	☺	30	
2	☻	30	
3	♥	30	
4	♦	30	
5	♣	30	
6	♠	30	
7	•	30	
8	◘	30	
9	○	30	
10	◙	30	
11	♂	30	
12	♀	30	
13	♪	30	
14	♫	30	
15	☼	30	
16	►	30	
17	◄	30	
18	↕	30	
19	‼	30	
20	¶	30	
21	§	30	
22	▬	30	
23	↨	30	
24	↑	30	
25	↓	30	
26	→	30	
27	←	30	
28	∟	30	
29	↔	30	
30	▲	30	
31	▼	30	
127	⌂	30	
128	Ç	42	
129	ü	36	
130	é	30	
131	â	30	
132	ã	30	
133	à	30	
134	Á	30	
135	ç	30	
136	ê	30	
137	Ê	36	
138	è	30	

ASCII code	Char.	Width	
		Normal	Script
139	ï	24	
140	Ô	42	
141	ì	18	
142	Ã	42	
143	Å	42	
144	É	36	
145	À	42	
146	È	42	
147	ô	30	
148	õ	30	
149	ò	30	
150	Ú	36	
151	ù	36	
152	ÿ	24	
153	Õ	42	
154	Ü	42	
155	ç	30	
156	£	30	
157	ũ	42	
158	₧	42	
159	Ó	42	
160	á	30	
161	í	18	
162	ó	30	
163	ú	36	
164	ñ	36	
165	Ñ	42	
166	ª	30	
167	º	30	
168	¿	30	
169	Ô	30	
170	¬	30	
171	½	30	
172	¼	30	
173	¡	30	
174	«	42	
175	»	42	
224	α	30	
225	ß	36	
226	Γ	36	
227	π	36	
228	Σ	42	
229	σ	36	
230	µ	36	

ASCII code	Char.	Width	
		Normal	Script
231	τ	30	
232	Φ	42	
233	θ	42	
234	Ω	42	
235	δ	30	
236	∞	30	
237	ø	42	
238	ε	30	
239	∩	30	
240	≡	30	
241	±	30	
242	≥	30	
243	≤	30	
246	÷	30	
247	≈	30	
248	°	30	
249	∙	30	
250	·	30	
251	√	30	
252	ⁿ	30	
253	²	30	
254	■	30	
255	SP	30	

Compressed PS width is ½ of Normal PS.

Unit: 1⁄360 inch (0.07 mm)

IBM Proprinter X24E Mode Characters (Canada)

ASCII code	Char.	Width	
		Normal	Script
0		30	
1	☺	30	
2	☻	30	
3	♥	30	
4	♦	30	
5	♣	30	
6	♠	30	
7	•	30	
8	◘	30	
9	○	30	
10	◙	30	
11	♂	30	
12	♀	30	
13	♪	30	
14	♫	30	
15	☼	30	
16	►	30	
17	◄	30	
18	↕	30	
19	‼	30	
20	¶	30	
21	§	30	
22	▬	30	
23	↨	30	
24	↑	30	
25	↓	30	
26	→	30	
27	←	30	
28	∟	30	
29	↔	30	
30	▲	30	
31	▼	30	
127	⌂	30	
128	Ç	42	
129	ü	36	
130	é	30	
131	â	30	
132	Â	42	
133	à	30	
134	¶	30	
135	ç	30	
136	ê	30	
137	ë	30	
138	è	30	

ASCII code	Char.	Width	
		Normal	Script
139	ï	18	
140	î	18	
141	‗	30	
142	À	42	
143	§	30	
144	É	36	
145	æ	36	
146	Æ	36	
147	ô	30	
148	ö	36	
149	ò	24	
150	û	36	
151	ù	36	
152	¤	30	
153	Ö	42	
154	Ü	42	
155	¢	30	
156	£	30	
157	Ù	30	
158	Û	42	
159	ƒ	30	
160	¦	30	
161	´	30	
162	ó	30	
163	ú	36	
164	¨	30	
165		30	
166	ª	30	
167	º	30	
168	¿	24	
169	⌐	30	
170	¬	30	
171	½	30	
172	¼	30	
173	¡	30	
174	«	42	
175	»	42	
224	α	30	
225	ß	36	
226	Γ	36	
227	π	36	
228	Σ	42	
229	σ	36	
230	µ	36	

ASCII code	Char.	Width	
		Normal	Script
231	τ	30	
232	Φ	42	
233	Θ	42	
234	Ω	42	
235	δ	30	
236	∞	30	
237	φ	42	
238	ε	30	
239	∩	30	
240	≡	30	
241	±	30	
242	≥	30	
243	≤	30	
246	÷	30	
247	≈	30	
248	°	30	
249	∙	30	
250	·	30	
251	√	30	
252	ⁿ	30	
253	²	30	
254	■	30	
255	BP	30	

Compressed PS width is ½ of Normal PS.

Unit: 1/360 inch (0.07 mm)

IBM Proprinter X24E Mode Characters (Norway)

ASCII code	Char.	Width	
		Normal	Script
0		30	
1	☺	30	
2	☻	30	
3	♥	30	
4	♦	30	
5	♣	30	
6	♠	30	
7	•	30	
8	◘	30	
9	○	30	
10	◙	30	
11	♂	30	
12	♀	30	
13	♪	30	
14	♫	30	
15	☼	30	
16	►	30	
17	◄	30	
18	↕	30	
19	‼	30	
20	¶	30	
21	§	30	
22	▬	30	
23	↨	30	
24	↑	30	
25	↓	30	
26	→	30	
27	←	30	
28	∟	30	
29	↔	30	
30	▲	30	
31	▼	30	
127	⌂	30	
128	Ç	42	
129	ü	36	
130	é	30	
131	â	30	
132	ä	30	
133	à	30	
134	å	30	
135	ç	30	
136	ê	30	
137	ë	30	
138	è	30	

ASCII code	Char.	Width	
		Normal	Script
139	ï	18	
140	î	18	
141	ì	18	
142	Ä	42	
143	Å	42	
144	É	36	
145	æ	42	
146	Æ	42	
147	ô	30	
148	ö	30	
149	ò	30	
150	û	36	
151	ù	36	
152	ÿ	36	
153	Ö	42	
154	Ü	42	
155	ø	30	
156	£	30	
157	Ø	42	
158	₧	42	
159	ƒ	30	
160	á	30	
161	í	18	
162	ó	30	
163	ú	36	
164	ñ	36	
165	Ñ	42	
166	ª	30	
167	º	30	
168	¿	30	
169	⌐	30	
170	¬	30	
171	½	30	
172	¼	30	
173	¡	30	
174	«	42	
175	¤	30	
224	α	30	
225	ß	36	
226	Γ	36	
227	π	36	
228	Σ	42	
229	σ	36	
230	µ	36	

ASCII code	Char.	Width	
		Normal	Script
231	τ	30	
232	Φ	42	
233	Θ	42	
234	Ω	42	
235	δ	30	
236	∞	30	
237	ø	42	
238	ε	30	
239	∩	30	
240	≡	30	
241	±	30	
242	≥	30	
243	≤	30	
246	÷	30	
247	≈	30	
248	°	30	
249	•	30	
250	·	30	
251	√	30	
252	ⁿ	30	
253	²	30	
254	■	30	
255	SP	30	

Compressed PS width is ½ of Normal PS.

Unit: 1/360 inch (0.07 mm)

Appendix C

Structure of an Index Table Entry

10 cpi draft font

Address	Data
8010	40
8011	D3454A090000000000
801A	D3634A090000000000
8023	D3814A090000000000
802C	D39F4A090000000000
8035	D3BD4A090000000000
803E	D3DB4A090000000000
8047	D3F94A090000000000
8050	D417480900000000000
8059	D42F480900000000000
8062	D447480900000000000
806B	D45F4A090000000000
8074	D47D480900000000000
807D	D4954A090000000000
8086	D4B34A090000000000
808F	D4D14A090000000000
8098	D4EF4A090000000000
80A1	D50D4A090000000000
80AA	D52B4A090000000000
80B3	D5494A090000000000
80BC	D567490900000000000
80C5	D585490900000000000
80CE	D59D480900000000000
80D7	D5B546090000000000
80E0	D5C74A090000000000
80E9	D5E54A090000000000
80F2	D6034A090000000000
80FB	D621490900000000000
8104	D63C490900000000000
810D	D657460900000000000
8116	D669480900000000000
811F	D6814A090000000000
8128	D69F4A090000000000
8131	D6BD420900000000000
813A	D6C346090000000000
8143	D6D546090000000000
814C	D6E749090000000000

8155	D7024A090000000000
815E	D7204A090000000000
8167	D73E4A090000000000
8170	D75C440900000000000
8179	D768470900000000000
8182	D77D470900000000000
818B	D7924A090000000000
8194	D7B048090000000000
819D	D7C846090000000000
81A6	D7DA46090000000000
81AF	D7EC46090000000000
81B8	D7FE4A090000000000
81C1	D81C480900000000000
81CA	D8344609000000000
81D3	D8464A090000000000
81DC	D864480900000000000
81E5	D87C490900000000000
81EE	D897490900000000000
81F7	D8B249090000000000
8200	D8CD490900000000000
8209	D8E848090000000000
8212	D900490900000000000
821B	D91B460900000000000
8224	D92D460900000000000
822D	D93F4A090000000000
8236	D95D460900000000000
823F	D96F4A090000000000
8248	D98D4A090000000000
8251	D9AB4A090000000000
825A	D9C94A090000000000
8263	D9E747090000000000
826C	D9FC480900000000000
8275	DA1447090000000000
827E	DA2947090000000000
8287	DA3E47090000000000
8290	DA534A090000000000
8299	DA7145090000000000

82A2	DA8048090000000000
82AB	DA9847090000000000
82B4	DAAD49090000000000
82BD	DAC846090000000000
82C6	DADA4A090000000000
82CF	DAF84A090000000000
82D8	DB1648090000000000
82E1	DB2E47090000000000
82EA	DB434A090000000000
82F3	DB6148090000000000
82FC	DB7948090000000000
8305	DB9146090000000000
830E	DBA348090000000000
8317	DBBB4A090000000000
8320	DBD94A090000000000
8329	DBF74A090000000000
8332	DC154A090000000000
833B	DC334A090000000000
8344	DC5146090000000000
834D	DC634A090000000000
8356	DC8146090000000000
835F	DC934A090000000000
8368	D6BDC3890000000000
8371	DCB147090000000000
837A	DC6480900000000000
8383	DCDE49090000000000
838C	DCF948090000000000
8395	DD1149090000000000
839E	DD2C48090000000000
83A7	DD4448090000000000
83B0	DD5C48090000000000
83B9	DD7449090000000000
83C2	DD8F48090000000000
83CB	DDA749090000000000
83D4	DDC24A090000000000
83DD	DDE046090000000000
83E6	DDF249090000000000
83EF	DE0D49090000000000
83F8	DE2848090000000000
8401	DE4048090000000000
840A	DE5848090000000000

8413	DE7049090000000000
841C	DE8B48090000000000
8425	DEA348090000000000
842E	DEBB49090000000000
8437	DED64A090000000000
8440	DEF44A090000000000
8449	DF124A090000000000
8452	DF304A090000000000
845B	DF4E4A090000000000
8464	DF6C48090000000000
846D	DF8444090000000000
8476	DF9048090000000000
847F	DFA84A090000000000
8488	DFC64A090000000000
8491	DFE44A090000000000
849A	E002490900000000000
84A3	E01D4A090000000000
84AC	E03B4A090000000000
84B5	E059490900000000000
84BE	E0744A090000000000
84C7	E0924A090000000000
84D0	E0B04A090000000000
84D9	E0CE4A090000000000
84E2	E0EC48090000000000
84EB	E1044A090000000000
84F4	E122490900000000000
84FD	E13D4A090000000000
8506	E15B47090000000000
850F	E1704A090000000000
8518	E18E4A090000000000
8521	E1AC48090000000000
852A	E1C44A090000000000
8533	E1E248090000000000
853C	E1FA4A090000000000
8545	E218480900000000000
854E	E2304A090000000000
8557	E24E4A090000000000
8560	E26C4A090000000000
8569	E28A4A090000000000
8572	E2A848090000000000
857B	E2C048090000000000

8584	E2D84A090000000000
858D	E2F64A090000000000
8596	E3144A090000000000
859F	E33249090000000000
85A8	E34D4A090000000000
85B1	E36B4A090000000000
85BA	E38948090000000000
85C3	E3A14A090000000000
85CC	E3BF4A090000000000
85D5	E3DD4A090000000000
85DE	E3FB4A090000000000
85E7	E419490900000000000
85F0	E434480900000000000
85F9	E44C4A090000000000
8602	E46A460900000000000
860B	E47C460900000000000
8614	E48E4A090000000000
861D	E4AC4A090000000000
8626	E4CA460900000000000
862F	E4DC4A090000000000
8638	E4FA4A090000000000
8641	E518C9090000000000
864A	E533C8090000000000
8653	E54BC9090000000000
865C	E566C4490000000000
8665	E572C5490000000000
866E	E581C5490000000000
8677	E590C7490000000000
8680	E5A5C7490000000000
8689	E5BAC5490000000000
8692	E5C9C7490000000000
869B	E5DEC6490000000000
86A4	E5F0C7490000000000
86AD	E605C7490000000000
86B6	E61AC7490000000000
86BF	E62FC5490000000000
86C8	E63EC5490000000000
86D1	E64DC4490000000000
86DA	E659C5490000000000
86E3	E668C5490000000000
86EC	E677C4490000000000

86F5	E683C3490000000000
86FE	E68CC5490000000000
8707	E69BC4490000000000
8710	E6A7C6490000000000
8719	E6B9C6490000000000
8722	E6CBC6490000000000
872B	E6DDC7490000000000
8734	E6F2C7490000000000
873D	E707C6490000000000
8746	E719C3490000000000
874F	E722C7490000000000
8758	E737C5490000000000
8761	E746C7490000000000
876A	E75BC5490000000000
8773	E76AC7490000000000
877C	E77FC6490000000000
8785	E791C4490000000000
878E	E79DC4490000000000
8797	E7A9C6490000000000
87A0	E7BBC7490000000000
87A9	E7D0C5490000000000
87B2	E7DFC5490000000000
87BB	E7EEC4490000000000
87C4	E7FAC3490000000000
87CD	E803C3490000000000
87D6	E80CC5490000000000
87DF	E81BC4490000000000
87E8	E827C3490000000000
87F1	E8304A090000000000
87FA	E84E4A090000000000
8803	E86C460900000000000
880C	E87E480900000000000
8815	E896490900000000000
881E	E8B148090000000000
8827	E8C94A090000000000
8830	E8E748090000000000
8839	E8FF4A090000000000
8842	E91D480900000000000
884B	E935480900000000000
8854	E94D480900000000000
885D	E9654A090000000000

8866	E9834A090000000000
886F	E9A149090000000000
8878	E9BC49090000000000
8881	E9D744090000000000
888A	E9E348090000000000
8893	E9FB4A090000000000
889C	EA194A090000000000
88A5	EA37C7490000000000
88AE	EA4C47090000000000
88B7	EA614A090000000000
88C0	EA7F4A090000000000
88C9	EA9D48090000000000
88D2	EAB548090000000000
88DB	EACD46090000000000
88E4	EADF4A090000000000
88ED	EAFD49090000000000
88F6	EB1849090000000000
88FF	EB3346090000000000
8908	EB4542090000000000

10 cpi LQ font

Address	Data
8911	41
8912	A4145C230000000000
891B	A46859230000000000
8924	A4B35B230000000000
892D	A50459230000000000
8936	A54F5B230000000000
893F	A5A059230000000000
8948	A5EB5B230000000000
8951	A63C48230000000000
895A	A6544D230000000000
8963	A67B50230000000000
896C	A6AB4F230000000000
8975	A6D855230000000000
897E	A71750230000000000
8987	A74757230000000000
8990	A78C54230000000000
8999	A7C856230000000000
89A2	A80A4A230000000000
89AB	A8284A230000000000
89B4	A84656230000000000
89BD	A8884A230000000000
89C6	A8A64D230000000000
89CF	A8CD59230000000000
89D8	A91844230000000000
89E1	A92456230000000000
89EA	A96656230000000000
89F3	A9A856230000000000
89FC	A9EA4E230000000000
8A05	AA144E230000000000
8A0E	AA3E45230000000000
8A17	AA4D58230000000000
8A20	AA955A230000000000
8A29	AAE35A230000000000
8A32	AB3142230000000000
8A3B	AB3748230000000000
8A44	AB4F4E230000000000
8A4D	AB794E230000000000
8A56	ABA355230000000000
8A5F	ABE259230000000000

Appendix C

8A68	AC2D5A230000000000	8BD0	B3AD5B230000000000
8A71	AC7B48230000000000	8BD9	B3FE54230000000000
8A7A	AC934C230000000000	8BE2	B43A4C230000000000
8A83	ACB74C230000000000	8BEB	B45E5B230000000000
8A8C	ACDB58230000000000	8BF4	B4AF53230000000000
8A95	AD2346230000000000	8BFD	B4E857230000000000
8A9E	AD354D230000000000	8C06	B52D4A230000000000
8AA7	AD5C44230000000000	8C0F	B54B50230000000000
8AB0	AD6846230000000000	8C18	B57B5C230000000000
8AB9	AD7A5C230000000000	8C21	B5CF5E230000000000
8AC2	ADCE54230000000000	8C2A	B62956230000000000
8ACB	AE0A4A230000000000	8C33	B66B58230000000000
8AD4	AE2856230000000000	8C3C	B6B358230000000000
8ADD	AE6A55230000000000	8C45	B6FB45230000000000
8AE6	AEA954230000000000	8C4E	B70A5C230000000000
8AEF	AEE551230000000000	8C57	B75E45230000000000
8AF8	AF1857230000000000	8C60	B76D4C230000000000
8B01	AF5D53230000000000	8C69	AB31C2A30000000000
8B0A	AF9654230000000000	8C72	B79149230000000000
8B13	AFD257230000000000	8C7B	B7AC53230000000000
8B1C	B01746230000000000	8C84	B7E553230000000000
8B25	B0294E230000000000	8C8D	B81E56230000000000
8B2E	B053502300000000000	8C96	B86053230000000000
8B37	B083442300000000000	8C9F	B89954230000000000
8B40	B08F502300000000000	8CA8	B8D54B230000000000
8B49	B0BF532300000000000	8CB1	B8F656230000000000
8B52	B0F855230000000000	8CBA	B93858230000000000
8B5B	B1375F230000000000	8CC3	B9804A230000000000
8B64	B1944F230000000000	8CCC	B99E4B230000000000
8B6D	B1C156230000000000	8CD5	B9BF58230000000000
8B76	B2034F230000000000	8CDE	BA074A230000000000
8B7F	B23049230000000000	8CE7	BA2554230000000000
8B88	B24B49230000000000	8CF0	BA6155230000000000
8B91	B26656230000000000	8CF9	BAA056230000000000
8B9A	B2A84A230000000000	8D02	BAE253230000000000
8BA3	B2C646230000000000	8D0B	B1B532300000000000
8BAC	B2D84E230000000000	8D14	BB544D230000000000
8BB5	B30257230000000000	8D1D	BB7B56230000000000
8BBE	B34748230000000000	8D26	BBBD4F230000000000
8BC7	B35F5A230000000000	8D2F	BBEA54230000000000

8D38	BC265A230000000000
8D41	BC7460230000000000
8D4A	BCD458230000000000
8D53	BD1C5D230000000000
8D5C	BD735A230000000000
8D65	BDC14E230000000000
8D6E	BDEB44230000000000
8D77	BDF74E230000000000
8D80	BE214E230000000000
8D89	BE4B5C230000000000
8D92	BE9F5A230000000000
8D9B	BEED56230000000000
8DA4	BF2F58230000000000
8DAD	BF7756230000000000
8DB6	BFB955230000000000
8DBF	BFF856230000000000
8DC8	C03A57230000000000
8DD1	C07F55230000000000
8DDA	C0BE56230000000000
8DE3	C10055230000000000
8DEC	C13F59230000000000
8DF5	C18A50230000000000
8DFE	C1BA52230000000000
8E07	C1F04C230000000000
8E10	C2145E230000000000
8E19	C26E5E230000000000
8E22	C2C84E230000000000
8E2B	C2F258230000000000
8E34	C33A55230000000000
8E3D	C37958230000000000
8E46	C3C156230000000000
8E4F	C4035A230000000000
8E58	C45156230000000000
8E61	C49358230000000000
8E6A	C4DB5C230000000000
8E73	C52F58230000000000
8E7C	C57752230000000000
8E85	C5AD51230000000000
8E8E	C5E057230000000000
8E97	C6255A230000000000
8EA0	C6735B230000000000
8EA9	C6C454230000000000
8EB2	C7005723000000000
8EBB	C7454E230000000000
8EC4	C76F5B230000000000
8ECD	C7C057230000000000
8ED6	C80556230000000000
8EDF	C8475C230000000000
8EE8	C89B55230000000000
8EF1	C8DA54230000000000
8EFA	C91654230000000000
8F03	C95245230000000000
8F0C	C96145230000000000
8F15	C97051230000000000
8F1E	C9A350230000000000
8F27	C9D348230000000000
8F30	C9EB58230000000000
8F39	CA3358230000000000
8F42	CA7BC9230000000000
8F4B	CA96C9230000000000
8F54	CAB1C9230000000000
8F5D	CACCC4630000000000
8F66	CAD8C4630000000000
8F6F	CAE4C4630000000000
8F78	CAF0C6630000000000
8F81	CB02C6630000000000
8F8A	CB14C4630000000000
8F93	CB20C6630000000000
8F9C	CB32C6630000000000
8FA5	CB44C6630000000000
8FAE	CB56C6630000000000
8FB7	CB68C6630000000000
8FC0	CB7AC4630000000000
8FC9	CB86C4630000000000
8FD2	CB92C4630000000000
8FDB	CB9EC4630000000000
8FE4	CBAAC4630000000000
8FED	CBB6C4630000000000
8FF6	CBC2C2630000000000
8FFF	CBC8C4630000000000
9008	CBD4C4630000000000
9011	CBE0C6630000000000

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901A	CBF2C6630000000000
9023	CC04C6630000000000
902C	CC16C6630000000000
9035	CC28C6630000000000
903E	CC3AC6630000000000
9047	CC4CC2630000000000
9050	CC52C6630000000000
9059	CC64C4630000000000
9062	CC70C6630000000000
906B	CC82C4630000000000
9074	CC8EC6630000000000
907D	CCA0C6630000000000
9086	CCB2C4630000000000
908F	CCBEC4630000000000
9098	CCCAC6630000000000
90A1	CCDCC6630000000000
90AA	CCEEC4630000000000
90B3	CCFAC4630000000000
90BC	CD06C4630000000000
90C5	CD12C2630000000000
90CE	CD18C2630000000000
90D7	CD1EC3630000000000
90E0	CD27C3630000000000
90E9	CD30C2630000000000
90F2	CD365E230000000000
90FB	CD905A230000000000
9104	CDDE482300000000000
910D	CDF6502300000000000
9116	CE2655230000000000
911F	CE6554230000000000
9128	CEA152230000000000
9131	CED74F230000000000
913A	CF0452230000000000
9143	CF3A582300000000000
914C	CF825A230000000000
9155	CFD056230000000000
915E	D0125523000000000
9167	D0515823000000000
9170	D0995123000000000
9179	D0CC522300000000000
9182	D1024423000000000

918B	D10E46230000000000
9194	D12050230000000000
919D	D15050230000000000
91A6	D180CF630000000000
91AF	D1AD4E230000000000
91B8	D1D748230000000000
91C1	D1EF50230000000000
91CA	D21F52230000000000
91D3	D2554823000000000
91DC	D26D46230000000000
91E5	D27F5E230000000000
91EE	D2D951230000000000
91F7	D30C4D230000000000
9200	D33344230000000000
9209	D33F42230000000000

Proportional Spacing LQ font

Address	Data
9212	43
9213	EB4B5B1D0000000000
921C	A4468581D0000000000
9225	A4B35A1D0000000000
922E	A504581D0000000000
9237	A54F5B1D0000000000
9240	A5A0591D0000000000
9249	A5EB5B1D0000000000
9252	A63C481D0000000000
925B	A6544C1D0000000000
9264	A67B501D0000000000
926D	A6AB4E1D0000000000
9276	A6D8551D0000000000
927F	A717501D0000000000
9288	A747561D0000000000
9291	A78C531D0000000000
929A	A7C8551D0000000000
92A3	A80A4A1D0000000000
92AC	A8284A1D0000000000
92B5	A846561D0000000000
92BE	EB9C4A1D0000000000
92C7	EBBA4E1D0000000000
92D0	EBE4581D0000000000
92D9	A918441D0000000000
92E2	A924561D0000000000
92EE	A966561D0000000000
92F4	A9A8561D0000000000
92FD	A9EA4D1D0000000000
9306	AA144E1D0000000000
930F	AA3E451D0000000000
9318	AA4D581D0000000000
9321	AA955A1D0000000000
932A	AAE35A1D0000000000
9333	EC2C421D0000000000
933C	EC32481D0000000000
9345	EC4A4E1D0000000000
934E	EC744E1D0000000000
9357	EC9E551D0000000000
9360	ECDD521D0000000000
9369	ED135A230000000000
9372	ED6148110000000000
937B	ED794C1D0000000000
9384	ED9D4C1D0000000000
938D	EDC1581D0000000000
9396	AD23461D0000000000
939F	EE094D1D0000000000
93A8	EE30441D0000000000
93B1	EE3C461D0000000000
93BA	EE4E5B1D0000000000
93C3	EE9F541D0000000000
93CC	EEDB4A1D0000000000
93D5	EEF9561D0000000000
93DE	EF3B531D0000000000
93E7	EF74531D0000000000
93F0	EFAD541D0000000000
93F9	EFE9571D0000000000
9402	F02E521D0000000000
940B	F064541D0000000000
9414	F0A0571D0000000000
941D	F0E5461D0000000000
9426	F0F74D1D0000000000
942F	B053501D0000000000
9438	B083441D0000000000
9441	B08F501D0000000000
944A	F11E531D0000000000
9453	F157551D0000000000
945C	F19660290000000000
9465	F1F652290000000000
946E	F22C58290000000000
9477	F27452290000000000
9480	F2AA49230000000000
9489	F2C54B230000000000
9492	F2E659290000000000
949B	F3314E290000000000
94A4	F35B461700000000000
94AD	F36D4E1D0000000000
94B6	F3975C290000000000
94BF	F3EB48230000000000

94C8	F4035E290000000000
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94DA	F4B45A290000000000
94E3	F5024E230000000000
94EC	F52C5E290000000000
94F5	F58655290000000000
94FE	F5C554230000000000
9507	F6014E290000000000
9510	F62B5C290000000000
9519	F67F61290000000000
9522	F6E261290000000000
952B	F74564290000000000
9534	F7B159290000000000
953D	F7FC59230000000000
9546	F847451D0000000000
954F	F8565B1D0000000000
9558	F8A7451D0000000000
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956A	AB31C29D0000000000
9573	F8E0491D0000000000
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9585	F93452230000000000
958E	F96A531D0000000000
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95A0	F9DC541D0000000000
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95BB	FA7556230000000000
95C4	FAB745110000000000
95CD	FAC64B110000000000
95D6	FAE753230000000000
95DF	FB2046110000000000
95E8	FB3258290000000000
95F1	FB7A53230000000000
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9603	FBEF53230000000000
960C	FC2853230000000000
9615	FC61501D0000000000
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9630	FCE254230000000000

9639	FD1E5A230000000000
9642	FD6C61290000000000
964B	FDCF58230000000000
9654	FE175D230000000000
965D	FE6E581D0000000000
9666	FEB64E1D0000000000
966F	FEE0441D0000000000
9678	FEEC4E1D0000000000
9681	FF164E1D0000000000
968A	BE4B5C1D0000000000
9693	FF405B290000000000
969C	4FFF56230000000000
96A5	5041591D0000000000
96AE	508C571D0000000000
96B7	50D1541D0000000000
96C0	510D571D0000000000
96C9	5152551D0000000000
96D2	5191561D0000000000
96DB	51D3571D0000000000
96E4	5218551D0000000000
96ED	5257581D0000000000
96F6	529F4B110000000000
96FF	52C04E110000000000
9708	52EA4A110000000000
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971A	536E60290000000000
9723	53CE4F230000000000
972C	53FB5D290000000000
9735	5452592900000000000
973E	549D581D0000000000
9747	54E5541D0000000000
9750	5521581D0000000000
9759	556957230000000000
9762	55AE56230000000000
976B	5F05D230000000000
9774	56475B290000000000
977D	569859290000000000
9786	56E3551D0000000000
978F	5722551D0000000000
9798	5761581D0000000000
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97AA	5806531D0000000000
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97BC	588449110000000000
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97CE	58EA57230000000000
97D7	592F56230000000000
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97F2	5A10541D0000000000
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980D	C961451D0000000000
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9831	5B005A290000000000
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9870	CAE4C45D0000000000
9879	CAF0C65D0000000000
9882	CB02C65D0000000000
988B	CB14C45D0000000000
9894	CB20C65D0000000000
989D	CB32C65D0000000000
98A6	CB44C65D0000000000
98AF	CB56C65D0000000000
98B8	CB68C65D0000000000
98C1	CB7AC45D0000000000
98CA	CB86C45D0000000000
98D3	CB92C45D0000000000
98DC	CB9EC45D0000000000
98E5	CBAAC45D0000000000
98EE	CBB6C45D0000000000
98F7	CBC2C25D0000000000
9900	CBC8C45D0000000000
9909	CBD4C45D0000000000
9912	CBE0C65D0000000000

991B	CBF2C65D0000000000
9924	CC04C65D0000000000
992D	CC16C65D0000000000
9936	CC28C65D0000000000
993F	CC3AC65D0000000000
9948	CC4CC25D0000000000
9951	CC52C65D0000000000
995A	CC64C45D0000000000
9963	CC70C65D0000000000
996C	CC82C45D0000000000
9975	CC8EC65D0000000000
997E	CCA0C65D0000000000
9987	CCB2C45D0000000000
9990	CCBEC45D0000000000
9999	CCCAC65D0000000000
99A2	CCDCC65D0000000000
99AB	CCEEC45D0000000000
99B4	CCFAC45D0000000000
99BD	CD06C45D0000000000
99C6	CD12C25D0000000000
99CF	CD18C25D0000000000
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99EA	CD30C25D0000000000
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9A20	5CDA54230000000000
9A29	5D1652230000000000
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9A3B	5D7356290000000000
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9A4D	5E035A290000000000
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9A8C	D10E461D0000000000
9A95	D120501D0000000000
9A9E	D150501D0000000000
9AA7	D180CF5D0000000000
9AB0	D1AD4E1D0000000000
9AB9	D1D7481D0000000000
9AC2	D1EF501D0000000000
9ACB	D21F521D0000000000
9AD4	D255481D0000000000
9ADD	D26D461D0000000000
9AE6	D27F5E1D0000000000
9AEF	5F0E511D0000000000
9AF8	5F414D1D0000000000
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9B0A	5F68421D0000000000

12 cpi LQ font

Address	Data
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9B14	5F6E581D0000000000
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9B26	A4B35A1D0000000000
9B2F	A504581D0000000000
9B38	A54F5B1D0000000000
9B41	A5A0591D0000000000
9B4A	A5EB5B1D0000000000
9B53	A63C481D0000000000
9B5C	A6544C1D0000000000
9B65	A67B501D0000000000
9B6E	A6AB4E1D0000000000
9B77	A6D8551D0000000000
9B80	A717501D0000000000
9B89	A747561D0000000000
9B92	A78C531D0000000000
9B9B	A7C8551D0000000000
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9BC8	5FE04D1D0000000000
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9BDA	A918441D0000000000
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9BEC	A966561D0000000000
9BF5	A9A8561D0000000000
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9C07	AA144E1D0000000000
9C10	AA3E451D0000000000
9C19	AA4D581D0000000000
9C22	AA955A1D0000000000
9C2B	AAE35A1D0000000000
9C34	AB31421D0000000000
9C3D	6040481D0000000000
9C46	60584E1D0000000000
9C4F	6082551D0000000000
9C58	60C1541D0000000000
9C61	60FD5C1D0000000000

9C6A	6151591D0000000000
9C73	619C481D0000000000
9C7C	61B44E1D0000000000
9C85	61DE4E1D0000000000
9C8E	6208571D0000000000
9C97	AD23461D0000000000
9CA0	624D481D0000000000
9CA9	6265441D0000000000
9CB2	6271461D0000000000
9CBB	6283501D0000000000
9CC4	62B3501D0000000000
9CCD	62E3461D0000000000
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9CDF	633A4F1D0000000000
9CE8	6367531D0000000000
9CF1	63A04F1D0000000000
9CFA	63CD551D0000000000
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9D0C	6445551D0000000000
9D15	6484551D0000000000
9D1E	64C3461D0000000000
9D27	64D5481D0000000000
9D30	B053501D0000000000
9D39	B083441D0000000000
9D42	B08F501D0000000000
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9D66	65B94D1D0000000000
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9D78	66104E1D0000000000
9D81	663A4B1D0000000000
9D8A	665B4A1D0000000000
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9DAE	66E24E1D0000000000
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9DC9	6763581D0000000000

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9DDB	67ED501D0000000000
9DE4	681D4D1D0000000000
9DED	6844551D0000000000
9DF6	6883501D0000000000
9DFF	68B3511D0000000000
9E08	68E64C1D0000000000
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9E59	6AF3451D0000000000
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9F28	6EE94A1D0000000000
9F31	6F07501D0000000000

Appendix C

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9F70	70D8441D0000000000
9F79	70E44A1D0000000000
9F82	71024D1D0000000000
9F8B	BE4B5C1D0000000000
9F94	7129561D0000000000
9F9D	716B531D0000000000
9FA6	71A4561D0000000000
9FAF	71E6561D0000000000
9FB8	7228571D0000000000
9FC1	726D571D0000000000
9FCA	72B2561D0000000000
9FD3	72F4561D0000000000
9FDC	7336531D0000000000
9FE5	736F531D0000000000
9FEE	73A8531D0000000000
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A009	74324D1D0000000000
A012	74595B1D0000000000
A01B	74AA571D0000000000
A024	74EF531D0000000000
A02D	7528591D0000000000
A036	7573541D0000000000
A03F	75AF541D0000000000
A048	75EB521D0000000000
A051	7621571D0000000000
A05A	7666531D0000000000
A063	769F561D0000000000
A06C	76E1581D0000000000
A075	7729521D0000000000
A07E	775F541D0000000000
A087	779B511D0000000000
A090	77CE581D0000000000
A099	78165C1D0000000000
A0A2	786A561D0000000000

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A0B4	78E8571D0000000000
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A0C6	7957571D0000000000
A0CF	799C551D0000000000
A0D8	79DB561D0000000000
A0E1	7A1D581D0000000000
A0EA	7A65541D0000000000
A0F3	7AA1501D0000000000
A0FC	7AD1501D0000000000
A105	C952451D0000000000
A10E	C961451D0000000000
A117	7B01521D0000000000
A120	7B37511D0000000000
A129	7B6A481D0000000000
A132	7B82561D0000000000
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A144	7C09C51D0000000000
A14D	7C18C51D0000000000
A156	7C27C31D0000000000
A15F	CACCC45D0000000000
A168	CAD8C45D0000000000
A171	CAE4C45D0000000000
A17A	CAF0C65D0000000000
A183	CB02C65D0000000000
A18C	CB14C45D0000000000
A195	CB20C65D0000000000
A19E	CB32C65D0000000000
A1A7	CB44C65D0000000000
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A1C2	CB7AC45D0000000000
A1CB	CB86C45D0000000000
A1D4	CB92C45D0000000000
A1DD	CB9EC45D0000000000
A1E6	CBAAC45D0000000000
A1EF	CBB6C45D0000000000
A1F8	CBC2C25D0000000000
A201	CBC8C45D0000000000
A20A	CBD4C45D0000000000
A213	CBE0C65D0000000000

A21C	CBF2C65D0000000000
A225	CC04C65D0000000000
A22E	CC16C65D0000000000
A237	CC28C65D0000000000
A240	CC3AC65D0000000000
A249	CC4CC25D0000000000
A252	CC52C65D0000000000
A25B	CC64C45D0000000000
A264	CC70C65D0000000000
A26D	CC82C45D0000000000
A276	CC8EC65D0000000000
A27F	CCA0C65D0000000000
A288	CCB2C45D0000000000
A291	CCBEC45D0000000000
A29A	CCCAC65D0000000000
A2A3	CCDCC65D0000000000
A2AC	CCEEC45D0000000000
A2B5	CCFAC45D0000000000
A2BE	CD06C45D0000000000
A2C7	CD12C25D0000000000
A2D0	CD18C25D0000000000
A2D9	CD1EC35D0000000000
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A33C	7DE6501D0000000000
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A3A8	D180CF5D0000000000
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A3DE	D26D461D0000000000
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A3F0	7F3C501D0000000000
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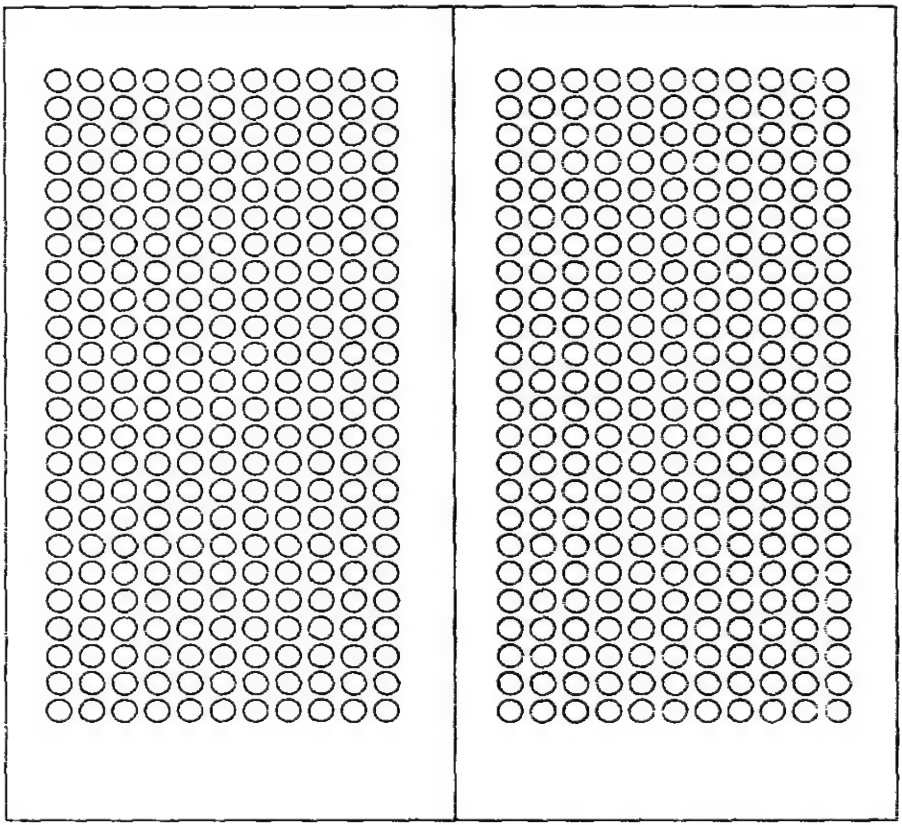
Appendix D

Download Character Matrix Blanks: Draft

24×11

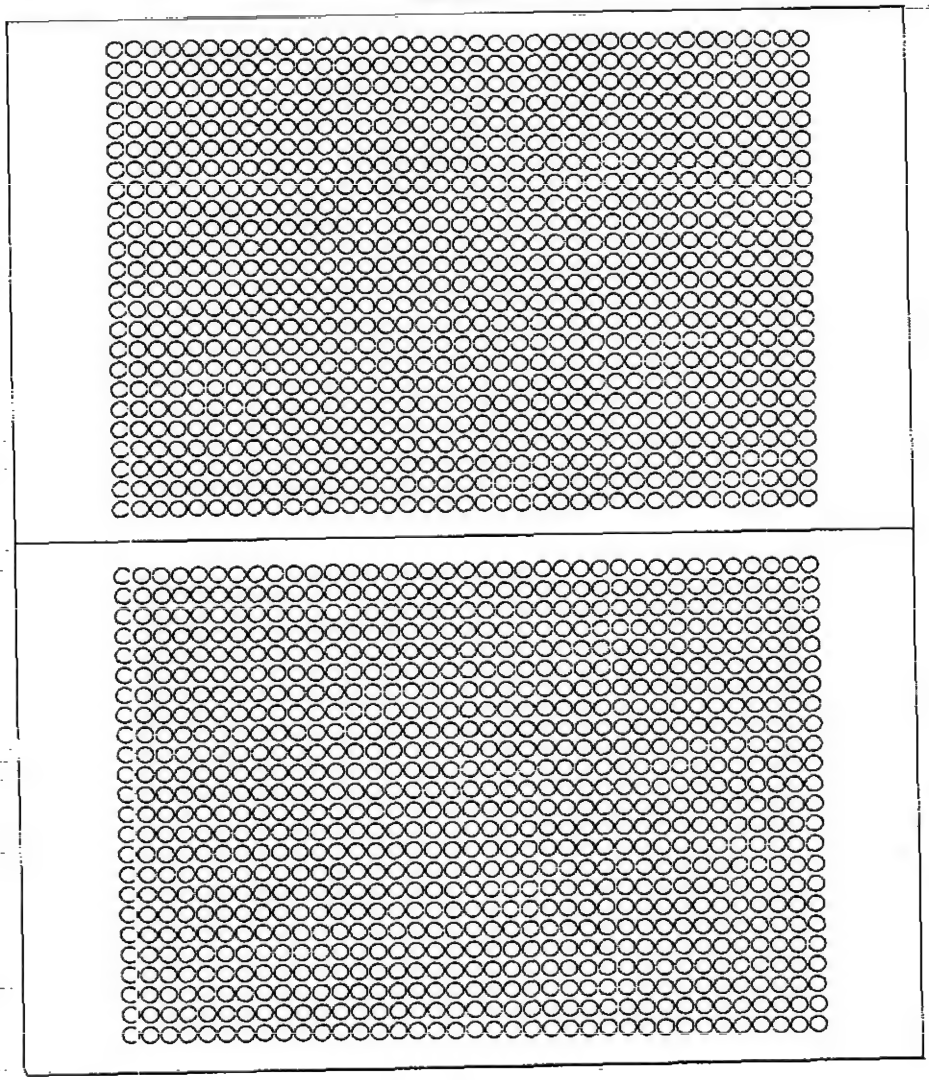


D

Make copies of this page first.
Then use blank matrices to design your download characters.

Download Character Matrix Blanks: LQ

24×37



Make copies of this page first.
Then use blank matrices to design your download characters.

Appendix E

Printer Specifications

Power requirements: Frequency: Current:	Refer to the nameplate located on the rear of the printer.
Interface:	Centronics parallel RS-232C/Serial interface board [KX-PS13, KX-PS14] (option)
Print fonts:	3 Draft (Pica, Elite, Micron) 8 Letter Quality (Courier, Prestige, Bold PS, Script, Sans Serif, Orator, Roman, OCR-B) 1 Super Letter Quality (Roman)
Software Emulation:	Epson LQ-860, IBM Proprinter X24E
Buffer:	20K (standard), additional 32K (optional KX-P43)
Character sets:	96 ASCII characters, 96 Italic ASCII characters, 33 International characters —14 language sets+Legal, 33 Italic International characters —14 language sets+Legal, 158 IBM-PC special characters—sets 1 &2, 38 Multilingual characters
Dot configuration:	1/127 inch (0.2 mm) dot diameter

	Draft	LQ	SLQ
Matrix (Hor.×Ver.)	9×24	30×24	30×48
Dot pitch (Hor.)	1/120" (0.21 mm)	1/360" (0.07 mm)	1/360" (0.07 mm)
(Ver.)	1/180" (0.14 mm)	1/180" (0.14 mm)	1/360" (0.07 mm)

(Continued)

Maximum number of characters per line (cpl): *Print line (8"/9")*	Print line — 8" / 9" Pica [10 characters per inch (cpi)] — 80 / 90 cpl Elite (12 cpi) — 96 / 108 cpl *Micron (15 cpi)* — *120 / 136 cpl* Compressed (17 cpi) — 137 / 155 cpl Elite compressed (20 cpi) — 160 / 181 cpl Pica elongated (5 cpi) — 40 / 45 cpl Elite elongated (6 cpi) — 48 / 54 cpl Micron elongated (7.5 cpi) — 60 / 68 cpl Compressed elongated (8.5 cpi) — 68 / 77 cpl Elite compressed elongated (10 cpi) — 80 / 90 cpl
Printing speed [characters per second (cps)]: with black	**Draft** — Micron 320 cps; Elite 256 cps; Pica 213 cps **LQ** — Micron 106 cps; Elite 85 cps; Pica 71 cps **SLQ** — Elite 42 cps; Pica 35 cps
Printing direction:	Bi-directional Character & Graphics Uni-directional Character & Graphics: Color Printing
Line feed time:	Approx. 90 msec [with 1/6 inch (4.2 mm) line feeding] 2.5 ips at Form Feed
Paper feed:	Pull/Push (user selectable) Tractor feed (with fanfold paper) Friction feed (with single sheet or envelopes)
Operating environment:	Temperature: 10°C~35°C {50°F~95°F} Humidity: 30~80% RH (Please allow the printer to stabilize at room temperature within the operating temperature range before operation)
Storage environment:	Temperature: −20°C~60°C {−4°F~140°F } Humidity 10~90% RH

(Continued)

Appendix E

Head service life:	Black ribbon: Approx. 200 million strokes in draft mode Color ribbon: Approx. 100 million strokes in draft mode
Ribbon:	Cassette seamless fabric ribbon Black ribbon cassette KX-P150: Life expectancy (in Draft mode) (rolling ASCII) Approx. 3 million Color ribbon cassette KX-P150C (option): Life expectancy (in Draft mode) (rolling ASCII) Black: Approx. 0.7 million Red (Magenta)/ Blue (Cyan): Approx. 0.7 million Yellow: Approx. 0.4 million
Dimensions:	484 (W)×391 (D)×160 (H) mm {19.0"×15.4"× 6.3"}
Mass {Weight}:	Approx. 8.5 kg {18.7 lbs.}

Paper Specifications

Paper which may be used with this unit must be within the specifications provided below.

Fanfold paper

Width: 4~10 inches (102~254 mm)
Quality and number of sheets:

Type of paper	Sheets	Weight			
		In lbs		In g/m²	
		push	pull	push	pull
Fine-quality paper	1	16~22	16~24	60~83	60~90
Non-carbon	2~4	11~14 (17*)		41~53 (64*)	
Multi-layered with carbon	2	11~14 (17*)		41~53 (64*)	

* only for the last sheet

Note:

- When using multi-part fanfold paper, especially in environments which have very high or low temperature and/or humidity, we recommend the use of the bottom feed pull mode to optimize paper handling and print quality.
- To insure optimum print quality, 16~22 lbs (60~83 g/m²) is recommended for graphic printing.
- In multi-layered paper with carbon, the carbon is equivalent to a sheet of paper.
- "Weight in pounds" represents the weight of 500 [17×22 inches (432×560 mm)] sheets.
- The printer will handle multipart papers up to 0.013 inch (0.32 mm). Up to 4 copies of 14 lb. chemical release paper can be used.
- Multipart forms consisting of 2 parts may be used for rear feeding (Push mode). For 3 or 4 part forms, we recommend bottom feeding for optimum print quality.

Appendix E

Single Sheet

Width: 4~11.7 inches (102~297 mm)
Height: 5~14.3 inches (127~363 mm)
Weight in pounds (g/m²): 14~24 (53~90 g/m²)

Note:
- Paper should be within operating temperature and humidity ranges at least 24 hours prior to use.

Envelope

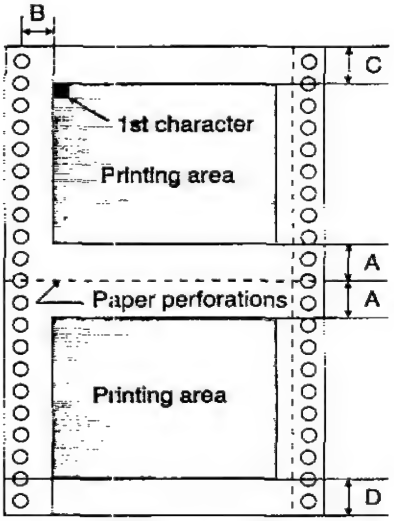
#6 and #10 size envelopes are recommended. Since envelopes vary in size, paper weight and construction, we cannot guarantee print quality and paper handling for all types of envelopes.

Note:
- To optimize print quality printing should not occur in areas where the edges overlap.

Appendix F

Printing Area

Fanfold paper



	Push	Pull
A	1" (25.4 mm)	
B	0.7" (17.8 mm)	
C	0.6" (15.2 mm)	5.4" (137 mm)
D	1" (25.4 mm)	

A: Value A indicates the area near the paper perforations where the quality may not be optimum.

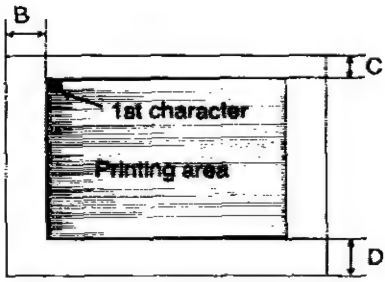
B: Value B indicates the minimum distance between the sprockets and first printable character. (When the left tractor is set on the left end and the margin is set to 0.)

C: Value C indicates the area from the top edge of the paper to the top of the first printed character.

D: Value D indicates the position where paper out is detected and printing may not be optimum.

Appendix F

Single sheet and Envelope



	Single Sheet and Envelopes
B	1.5" (38 mm)
C	0.6" (15.2 mm)
D	1" (25.4 mm)

B: Value B indicates the minimum distance between the edge of the paper and the first printable character. (When the left paper guide is set to the left end and the margin is set to 0.)

C: Value C indicates the area from the top edge of the paper to the top of the first printed character.

D: Value D indicates the position where paper out is detected and printing may not be optimum. (When printing on envelopes do not print on area where edges overlap. Print quality may not be optimum.)

Appendix G

Glossary

ASCII:
"ASCII" is an acronym for "American Standard Code for Information Interchange". In ASCII, each character has a unique code.

BASIC:
BASIC is a commonly used microcomputer programming language.

Baud (baud rate):
Baud is a unit of data transmission speed between computer devices. Can be but not necessarily equal to bits per second.

Bidirectional printing:
Processing speed is increased by bidirectional printing. That is, the printer prints right-to-left as well as in the normal left-to-right manner.

Binary:
Binary is a numbering system using the two digits of zero (0) and one (1).

Bit:
Bit is an abbreviation for "binary digit (0~1)", and is the smallest unit of information used by a printer or computer.

Buffer:
Buffer is an area of memory which stores data temporarily.

Byte:
Byte is the unit of information used by a printer or computer. One byte is equivalent to eight (8) bits.

Character set:
Character set is the set of characters, numbers, and symbols available for printing.

Control codes:
Control codes are commands from the computer to the printer that are non-printable characters. They are used to control printer functions.
(☞ P. 4-1)

cpi:
"cpi" is an abbreviation for "characters per inch", and means the number of characters printed in one horizontal inch.

cpl:
"cpl" is an abbreviation for "characters per line", and means the maximum number of characters printed on one line.

cps:
"cps" is an abbreviation for "characters per second", and means the number of characters printed in one second.

CR (Carriage Return):
"CR" is a control code that returns the printhead to the left margin.

Decimal (Dec.):
Decimal is a numbering system composed of 10 digits 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9.

Default:
Default has two meanings: one indicates the previously set conditions or settings executed when the power is turned on, reset or initialized; and the other indicates the original settings when shipped from the factory (FACTORY settings).

Double strike printing:
Double printing is a print quality enhancing mode which uses a double strike with two passes of the printhead, feeding the paper 1/180 inch (0.14 mm) between the first and second pass (in Epson mode only).

Double high printing:
Double high printing makes the height of a character twice that of a normal one.

Double wide printing:
Double wide printing makes the width of character twice that of a normal one.

Download character:
Download character is a character which the user can design.
(☞ P. 5-4—5-18)

Draft:
Draft is one of three print qualities available on this printer. Draft mode uses a minimum number of dots per character to maximize printing speed.

Emphasized printing:
Emphasized printing is a print quality enhancing mode done in one pass of the printhead at half speed, allowing horizontally adjacent dots to be printed producing a darker character.

Emulation:
Emulation means to operate like another printer.
This printer can emulate the Epson LQ-860 or the IBM Proprinter X24E.

Escape (ESC) sequence:
"ESC" is a control code that begins most printer commands. The characters which follow the "ESC" are interpreted as command, rather than characters to print.

Fanfold paper:
Fanfold paper has regularly spaced sprocket holes on the left and right sides and pages are separated by a perforation between each sheet. May also be known as computer paper or tractor paper.

FF (Form feed):
"FF" is a control code that advances the paper one page.

Font:
Font is a style and size of type designated by a family name.

FORTRAN:
FORTRAN is one of many computer programming languages, which is used primarily in scientific applications.

Function:
Function allows you to determine how the printer will operate.

Hexadecimal:
Hexadecimal is a numbering system using the 16 digits, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E and F.

Initialization:
Initialization means to reset the printer to the initial startup condition.

Interface:
Interface is the connection between the two separate systems, such as the computer and the printer. A parallel interface transfers data one character or code at a time, and a serial interface transfers data one bit at a time.

I/O:
"I/O" is the symbolic notation for "Input/Output".

Letter Quality (LQ):
LQ is one of three print qualities available on this printer. LQ mode increases the number of dots per character to improve the print quality but decreases the printing speed.

LF (Line Feed):
"LF" is a control code that advances the paper one line.

Liquid Crystal Display (LCD):
LCD is a display to show the messages which guide the operation or it may show the error messages. (☞ P. 9-5, 9-6) The message is composed of 16 characters maximum.

LSB:
"LSB" is an acronym for "Least Significant Bit", and means the rightmost position in a binary number.

MACRO memory function:
This feature allows this printer to easily save and recall a particular combination of functions, even if the power is turned off.

Menu:
Menu is a list of topics from which you can enter to select the desired conditions or settings. The Function mode in this printer is composed of a Main menu and Sub-menus. (☞ P. 3-9)

MICRO LINE FEED:
MICRO LINE FEED function allows you to feed the paper by one micro line (1/180 inch). (☞ P. 3-4)

MSB:
"MSB" is an acronym for "Most Significant Bit", and means the leftmost position in a binary number.

OFF LINE:
OFF LINE is the condition in which the printer can not communicate with the computer.

ON LINE:
ON LINE is the condition in which the printer can communicate with the computer.

Overline printing:
Overline printing produces a continuous line above the characters, using the first pin of the printhead.

Parallel interface:
☞ P. G-4 "Interface"

Parity:
Parity is a method for a computer and printer to check the accuracy of data transfer.

PASCAL:
PASCAL is a commonly used microcomputer programming language.

Perforation:
Perforation indicates the tear position on the fanfold paper.
(☞ P. F-1)

Pitch:
Pitch is the number of characters which will print in one inch. Pitch is equivalent to characters per inch (cpi).

Platen:
Platen is the rubber roller which is a backing for the paper when printing.

Printer drivers:
Most of today's off the shelf software programs use printer drivers to control printer functions. These drivers contain the software codes your software program uses to access printer features. With the printer driver installed, you will seldom need to know any of this printer commands.

Proportional spacing (PS):
Proportional spacing is a printing method of adjusting the character space in which a character is printed. A "w" will take up more space than an "i".

Protocol:
Protocol is the set of rules permitting communication between a computer and printer when a serial interface (RS-232C) is used. It covers polarity, baud rate, parity, data length, start bit and stop bit.

RAM:
RAM is an acronym for "Random Access Memory". It is the part of the printer's memory in which data is stored, control codes or download characters are to be printed. RAM is cleared when the printer is turned off.

ROM:
ROM is an acronym for "Read Only Memory". It is the part of the printer's memory in which predefined characters and operating information for the printer are stored. ROM is not cleared when the printer is turned off.

Self test:
Self test is a method for testing the operation of the printer.
(☞ P. 2-7)

Serial interface:
☞ P. G-4 "Interface"

Shielded Cable:
Shielded cable is a cable wrapped with a special metal around its wires. This guards against radio interference.

Skip perforation:
Skip perforation means nothing is printed in a specified area before and after the page perforation.

String concatenation:
This is the joining of two or more bytes of data into a single command.

Super Letter Quality (SLQ):
SLQ is one of three print qualities available on this printer. SLQ mode uses twice as many dots vertically per character to improve the print quality than LQ but decreases the printing speed even further.

Super QUIET mode:
Super QUIET mode is a helpful feature of this printer which reduces printing noise.

Top of Form:

Top of Form is the first line position on the paper. This printer has the "Top of Form function" a helpful feature which loads the paper automatically to the designated position.

Unidirectional printing:

The printer prints left-to-right only. Printing speed is slow compared with bidirectional printing. This print method permits better vertical alignment.

Index

Most of the software commands of Epson LQ-860 mode and IBM Proprinter X24E mode descriptions are not indexed here. For page references for Epson LQ-860 mode commands, see pages 6-1 through 6-5 in Section 6. For IBM Proprinter X24E mode commands, see pages 7-1 through 7-4 in Section 7.

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MEMO

OPTIONS and SUPPLIES

KX-PS13	RS-232C/Current Loop Serial Interface Board
KX-PS14	RS-232C/Serial Interface Board
KX-PT11	Auto Cut Sheet Feeder (Single Bin)
KX-P43	32K Buffer Chip
KX-P150	Ribbon Cassette (Black)
KX-P150C	Ribbon Cassette (4 Colors)
KX-PCK11	Color Kit (KX-P150C, Gear Unit, Motor Unit)

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